[Headband from Galen: De Simplicium, Venetiis, apud Iuntas, 1625.]

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CHINESE DRUG STORES

By K. K. CHEN, PH.D.

PEKING, CHINA

ORIGIN. The systematic use of drugs in China dates back to Emperor Shen Nung (3217–3077 B.C.), who tasted one hundred herbs and probably wrote the Pentsao,[1] which with subsequent additions serves to this day as the Chinese Dispensatory. A little later Lei Kung, premier to Emperor Huang Ti (2697–2597 B.C.), introduced methods of roasting and cooking to activate the drugs or to alter their action and Yi Yin, premier to Emperor Tang (1783–1760 B.C.), first prepared decoctions and infusions to facilitate oral administration. In those days, the physician collected, prepared and administered his own drugs. But the number of approved drugs was increasing day by day, and the separation of pharmacy from medicine followed as a natural result. Han K'ang, who lived in Eastern Han Dynasty (22–219 A.D.), appeared to be the first druggist, making displays of his drugs on market, and was noted for his honesty in the business. Drug stores were definitely in existence during the Sung dynasty (960–1276 A.D.), for Lu Chiu-Yuan, a philosopher, in his writings, spoke well of his brother as the proprietor of a drug store. Other writers in the same dynasty made similar remarks concerning the establishment of drug stores. Today Chinese physicians depend entirely on drug stores for filling and dispensing their prescriptions.

PHARMACY AS A PROFESSION. The principles of the keeper of a Chinese drug store are as a rule very high. Tablets bearing the characters which express love of humanity are prominently displayed as mottoes, and a prescription for the treatment of an emergency case is cheerfully filled at any hour of the night. The pharmacist, not bound by any legal restrictions, fears that the wrath of Heaven will be visited on himself and his descendants if he cheats his customers; and this proves a sufficient motive to maintain a high standard of service. It is worth noting that opium, which has become such a curse to China, is not sold in drug shops, and toxic substances such as arsenic, nux vomica, croton seeds and so forth cannot be purchased at any price except by prescription of a physician. This is in sharp contrast with "modern" pharmacies in China, in which morphine preparations and other narcotics can always be purchased under some fancy name, and which are taking on more and more the characteristics of department stores. But the simple, old, Chinese drug stores, while more moral and specialized than their competitors from the West, are bound to perish ultimately unless radical changes are made, for modern medicine is rapidly replacing the Chinese materia medica.

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[1] It is generally believed that the Pentsao was actually written by Shen Nung. It contained 360 drugs, divided into "superior," "medium" and "inferior" classes.

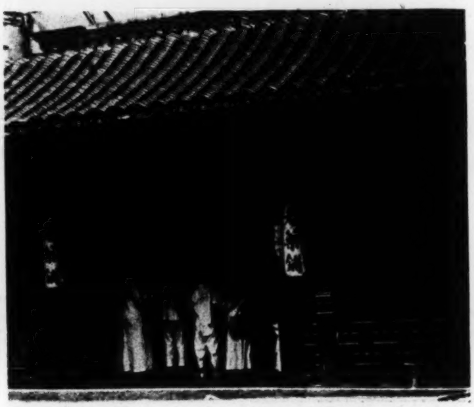

Fig. 1. Tung Jen T'ang, One of the Oldest Drug-stores and the Most Famous One in Peking and in China; in Fact, the Merck of China. It Was Established Some Time in the Ming Dynasty, 1368–1643 A.D., and Has Been Continuously under the Control of a Single Family. The Present Owner Cannot Tell Exactly in Which Year the Store Was Founded. The Crowd of Customers, as Shown Here, Attends from Early in the Morning until Late in the Evening, for the Whole Year Round.

Organization of the Drug Store. The proprietor is the center of importance, the success or failure of the business depending entirely on his ability. He supervises and is responsible for everything that is done in the shop. Next to him is a man of considerable experience and ability who attends to the accounts and to the purchasing of drugs, at an annual salary of two or three hundred dollars (silver) though he in addition gets a share in the profits of the shop which may exceed his nominal salary. Then there will be one or more "teachers," whose status is analogous to that of graduate pharmacists, on an annual salary of one hundred or more dollars; their chief duty is to fill the prescriptions. The apprentices comprise the lowest rank of the personnel; they prepare the crude drugs for selling, and are required to keep the premises clean. Apprentices receive practically nothing except a small bonus from the profits according to the good will of the proprietor and the character of their services. After three years the apprentices become teachers and begin their professional career as such. The senior members of the firm above the rank of teachers live with their families in their own homes, while the teachers and apprentices are given free lodgings in the shop. All of the personnel are provided with food by the proprietor without charge. The working hours are not sharply defined, the senior officers usually arriving at seven or eight in the morning and leaving at six or seven in the evening. Work proceeds on Sundays as on other days and there are no holidays excepting at the Chinese New Year Festival, when the store is partly or completely closed for ten to fifteen days.

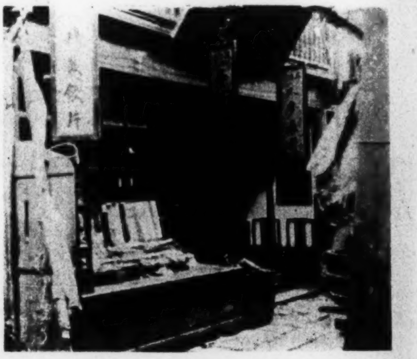

Fig. 2. A Rural Drug-store, the Proprietor of Which Allows the Display of Socks for Sale by His Neighbor in the Front of His Prescription Counter. The Signs Are Also Shown.

Size of the Drug Store. The store usually occupies one to three front rooms (Figs. 1 and 2). No show window is provided, but the permanent signs such as: "Most reliable drugs from all provinces";

"Ginseng and Deerhorn a speciality"; and so forth serve as the only advertisements. One or more storerooms are provided for crude drugs, a kitchen for cooking, roasting, and distilling herbs, sometimes a small garden for cultivating common native drugs, and bedrooms for the teachers and apprentices.

INVENTORY. The prescription counter occupies the very front of the front room, while the money counter often stays in the rear, for greater safety perhaps. Numerous herbaceous drugs are placed in rows of labeled drawers (Fig. 3) built against the side wall. On the top shelves, above these drawers, are porcelain containers with lead lids (Figs. 4 and 5) in which are kept powdered drugs, pills, mixtures and minerals. Toxic substances such as arsenic trioxide are stored in a special box which is usually locked and hidden away. Valuable drugs like ginseng are protected from moulds by storing them in large desiccators containing lime as the dehydrating agent. Other furnishings of the front room consist of a few chairs and one or more tables.

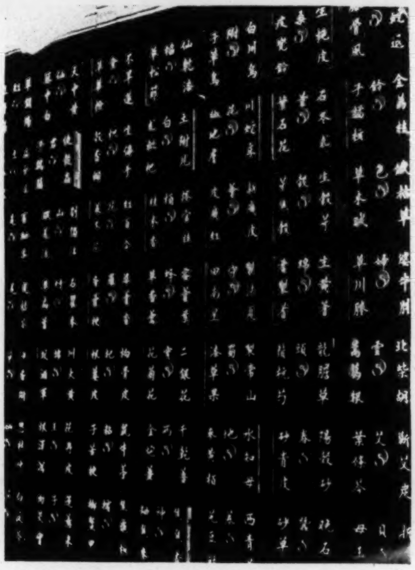

FIG. 3. ROWS OF DRAWERS WITH PERMANENT LABELS FOR THE KEEPING OF HERBACEOUS DRUGS.

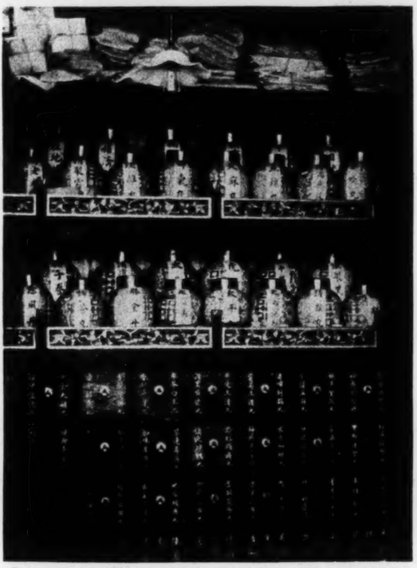

FIG. 4. PORCELAIN CONTAINERS WITH LEAD LIDS AND SPECIAL LABELS FOR THE KEEPING OF PILLS, MIXTURES, ETC.

As most of the crude drugs require some preparation before they can be dispensed, a certain amount of apparatus is required. Thus cooking, roasting, distilling, or coating with honey are done in a pan on a stove, the heat being generated by burning either rice straw or coal. Some roots or stems are cut or sliced with a special cutter (Fig. 8), while others are pulverized in an iron boat (Fig. 9), with a stone mill (Fig. 10), or with a bronze mortar and pestle (Fig. 7). When a fine powder is desired, a circular sieve made of silk about eighteen inches in diameter is used. Some drugs, such as almond seeds, are bruised with a wooden stick. Trituration is done with a porcelain mortar and pestle, differing little from the Western type.

SOURCES OF DRUGS. Most of the dry, undivided drugs are supplied by wholesale agents located in large cities such as Shanghai, Hankow and Peking. Some of them which are produced locally are bought from the person who collects them, usually a farmer. The proprietor himself may raise some fresh drugs, such as lotus leaves, which may be demanded, in the small garden connected with the store.

PREPARATIONS. In spite of lack of machinery, the Chinese druggist can skilfully make several forms of medication. Thus he has for sale powders, "adhesive plasters" made of vegetable resin mixed with some active drugs, pills and ointments to be ordered in advance. In summertime, he distills some volatile plants such as peppermint, wild rose and so forth, to make waters which are believed to have a cooling effect; while in winter when everybody needs a "tonic," he prepares semisolid extracts from individual prescriptions, by boiling the drugs with water and concentrating the fluid to the desired consistency. It is from these extracts that most of the income of the store is drawn. Frequently a galenical preparation from some secret prescription, handed to the store by a famous doctor through friendship or other personal connection, is sold. This often makes the store popular and draws people even from remote regions. It is interesting to note that the drug store does not pretend to sell "Elixir of Life" as the European apothecaries used to do.

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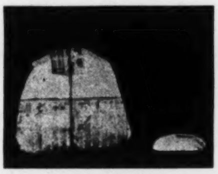
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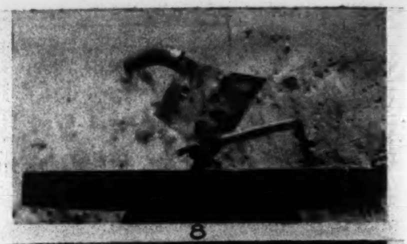
FIG. 5. A PORCELAIN CONTAINER. FIG. 6. A PACKAGE OF DRUGS FILLED FROM A PRESCRIPTION. THE BIG ONE CONTAINS SOME THIRTEEN SMALL ONES, ONE OF WHICH IS ALSO SHOWN. FIG. 7. A BRONZE MORTAR AND PESTLE.

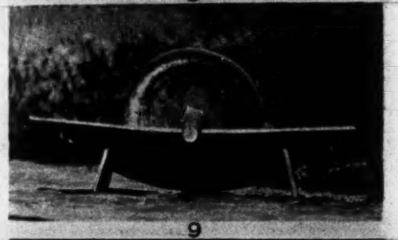
PRESCRIPTION. The form of prescriptions is shown in Figure 11. Each can be arbitrarily divided into superscription, inscription, subscription, signatura and signature. The superscription consists of the name and sex of the patient and the date of visit. It contains no word corresponding to Latin *recipe* or French *prenez*, but instead, a statement of symptoms, diagnosis and method of treatment usually based on ancient authorities. It is this part that can and often does make the prescription several pages long. The more important the patient is, such as the Emperor in previous times, the longer the statement will be (Fig. 11). The inscription usually consists of nine to thirteen crude drugs with proper dosage. Some of them are used as the bases, others as adjuvants, still others as correctives. The subscription is brief, and if any, is placed beside the individual drug. For instance, if almond seeds should be crushed, the direction is written right with this drug and not at the end of the prescription. Much of the signatura is assumed to be understood. Thus the patient knows that he should make a decoction out of these drugs at his home, and drink it. The time of medication and interval between doses are left to the patient's discretion. The number of doses (i.e., the number of new decoctions) is sometimes written in the prescription, but may not be mentioned, in which case the patient knows that it should not exceed three. Incidental directions to the patient are sometimes included, as for example when certain drugs are to be wrapped in silk in the preparation of the decoction. The signature of the doctor is ordinarily printed at the end as a sort of inverted letter head. The names of the physician's students also appear, as a proof of his popularity.

MEASURES AND WEIGHTS. As the Chinese drug store seldom sells any liquid preparation, measures are not in great demand. The weights are the ones used by the general public. Scales are universally adopted. As shown in Table 1, the weighing system goes by decimal units, similar to the metric system, except that one catty is made of sixteen liang:

With slight modification, the Chinese system can be easily made comparable with the metric system, an advantage which cannot be obtained in the avoirdupois system. On one occasion the writer had a chance to calibrate some of the weights used by a druggist and found the error not alarmingly great, as seen in Table II.

METHODS OF COMPOUNDNG A PRESCRIPTION. If one is confused with incompatibilities and technology in European pharmacy he should be a Chinese druggist. There is no text like the pharmacopeia to follow and there are no restrictive laws to obey. The Pentsao Kang Mu[2] is the dispensatory, but reference is seldom made to it. All the experience acquired is from the "teacher," and the knowledge of the latter is, in turn, obtained from his "teacher." The only essential part is to weigh the drugs and wrap them separately in home-made rice paper, the wrapping being done by folding one corner of a sheet, followed by two neighboring corners, and completed by slipping the fourth corner into the space formed by the adjacent corners, to make a





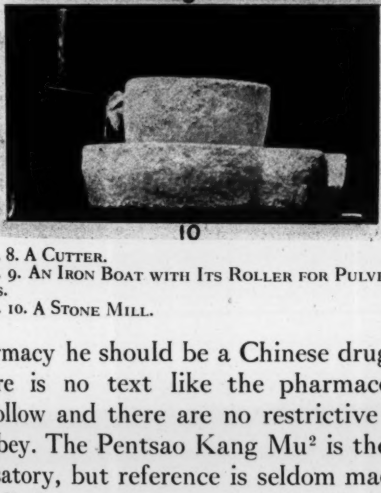
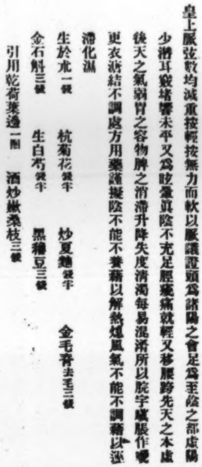


FIG. 8. A CUTTER.
FIG. 9. AN IRON BOAT WITH ITS ROLLER FOR PULVERIZING DRUGS.
FIG. 10. A STONE MILL.



光緒皇帝醫案
戊申四月十七日請得
皇上脈弦數均減重按輕按無力而軟以脈議證頭爲諸陽之會足爲至陰之部虛陽
少潛耳竅堵響未平又爲眩暈眞陰不充足脛痠痛就輕又移腰跨先天之本虛
後天之氣弱胃之容物脾之消滯升降失度清濁每易混淆所以脘宇腹脹作噯
更衣滯結不調處方用藥謹擬陰不能不養藉以解熱熄風氣不能不調藉以逐
滯化濕
生於朮一錢　杭菊花錢半　炒夏麯錢半　金毛脊去毛三錢
金石斛三錢　生白芍錢半　黑穞豆三錢
引用乾荷葉邊一圈　酒炒嫩桑枝三錢

FIG. 11. A PRESCRIPTION FOR THE LATE EMPEROR KUANG HSU OF THE CH'ING DYNASTY, WRITTEN BY HIS COURT PHYSICIAN. IT WAS PHOTOGRAPHED FROM THE COLLECTION OF THAT DOCTOR'S PRESCRIPTIONS, PUBLISHED SOME TIME AGO. THE FOLLOWING IS A BRIEF TRANSLATION:

"HIS MAJESTY

17TH. OF THE 4TH. MONTH[3] 34TH. YEAR (1908).

THE PULSE TENSION IS STILL WEAK FELT EITHER BY HEAVY OR SLIGHT PRESSURE, WHICH SHOULD BE CAREFULLY CONSIDERED IN THE PRESENT ILLNESS. THE HEAD IS THE CENTER OF 'YANG' (MALE PRINCIPLE),[4] WHILE THE FEET THAT OF 'YIN' (FEMALE PRINCIPLE). DEFICIENCY IN 'YANG' RESULTS IN RINGING OF EARS AND DIZZINESS, WHILE DEFICIENCY IN 'YIN' RESULTS IN LAMENESS OF FEET, EXTENDING TO GROIN AND WAIST. PATIENT'S ANTENATAL CONSTRUCTION IS HARDLY SOLID AND HIS POSTNATAL VITALITY NOT ANY TOO STRONG. THE FUNCTION OF THE STOMACH IS TO TAKE FOOD AND THAT OF THE SPLEEN TO ELIMINATE THE STAGNATED RESIDUE FROM DIGESTION; WHENEVER THIS HARMONY IS DISTURBED, THERE IS CONTAMINATION OF THE NUTRITION BY THE WASTE PRODUCTS, RESULTING IN THE COMPLAINT OF DISTENSION, HICCOUGH, AND INTERMITTENT CONSTIPATION AND DIARRHEA. THE METHOD OF TREATMENT BY MEANS OF DRUGS CONSISTS OF FOSTERING 'YIN' TO REMOVE TROUBLE, AND OF HELPING VITALITY TO PROMOTE DIGESTION.

ARISTOLOCHIA RECURVILABRAE, RAW	1	CHIEN[5]
CHRYSANTHEMUM SINENSE, FROM HANCHOW	1½	CHIEN
LEAVEN, SUMMER, ROASTED	1½	CHIEN
POLYPODIUM BAROMETZ	3	CHIEN
DENDROBIUM NOBILE, GOLDEN VARIETY	3	CHIEN
PAEONIA ALBIFLORA, RAW	1½	CHIEN
LOTUS LEAF, MARGIN	1	CIRCLE
MULBERRY TWIGS, ROASTED WITH WINE	3	CHIEN

HIS OBEDIENT SERVANT,
LIEN-FONG CHEN, M.D."

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[2] Pentsao Kang Mu is a revision of Pentsao by Li Shih-Cheng in 1596, greatly enlarged, containing 1,871 drugs under sixty-two orders and sixteen classes, in fifty-two chapters.

[3] The Chinese calendar is based on the lunar system.

[4] For the explanation of male and female principles, see Hsieh, E. T., *Anat. Rec.*, 1920–21, xx, 97.

[5] A Chinese unit of weight. For its metric equivalent see Table I.

small square package (Fig. 6). These small packages are wrapped together in a truncated pyramid (Fig. 6) and tied. This finishes the story of filling a prescription.

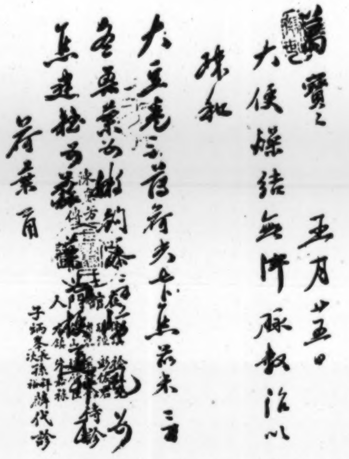

FIG. 12. A PRESCRIPTION FOR AN ORDINARY CITIZEN WRITTEN BY A DOCTOR, A PUPIL OF THE ABOVE-MENTIONED COURT PHYSICIAN, WHICH IS TRANSLATED AS FOLLOWS:

"MISS KE. 25TH. OF THE 5TH. MONTH.
FECES HARD AND DRY, WITHOUT SWEATING, PULSE FAST.
TREATMENT FOLLOWS THE PRINCIPLE OF HARMONY.

BEAN SPROUT	3	CHIEN
PEPPERMINT LEAVES	7	FEN
COIX LACRYMA, ROASTED	3	CHIEN
MULBERRY LEAVES, WINTER	1½	CHIEN
NAUCLEA RHYNOPHYLLA, YOUNG	3	CHIEN
SILER DIVERICATUM	1½	CHIEN
CHEAN CHU, ROASTED (A MIXTURE OF HERBS, WELL KNOWN TO DRUGGIST)	1½	CHIEN
PERILLA NANKINENSIS, LEAVES	1½	CHIEN
AKEBIA QUINATA, STEMS	1	CHIEN
LOTUS LEAF	1	CORNER

NAN-SUNG KING, M.D., PUPIL OF DR. LIEN-FONG CHEN (ACCOMPANIED BY THE NAMES OF HIS SEVEN STUDENTS, HIS SON, AND HIS TWO GRANDSONS)."

The prescription *per se* is returned to the patient, and is not kept though it is often copied by the druggist.

COOPERATION AMONG DRUGGISTS. There is no organization among the druggists, corresponding to the National Pharmaceutical Association; in fact little relation exists among men of the same profession. The most recent development of a uniting spirit is exhibited in the different organizations of local druggists, although the only function of such groups is to standardize the prices of drugs. This spirit of individualism of the Chinese druggists is in strong contrast with the tendency of cooperation among the European apothecaries who in the Middle Ages had already formed themselves into guilds. Thus in England as early as 1180 the pepperers organized into a guild, and in France the spicers and apothecaries became one of the guilds of "avoir du pois," which was changed to *Collège de Pharmacie* in 1780. In course of time, there must be reformation and unification of Chinese pharmacy. Whether it will be brought about by the state control as in Germany or by voluntary organization as is the case with the Central Pharmacy of France is a question remaining to be seen. The former seems to be more probable.

ACKNOWLEDGMENTS

The author wishes to acknowledge his indebtedness to Mr. Ma Kiam, head of the department of Chinese, Peking Union Medical College, for his assistance in collecting material for the origin of the Chinese drug store and in the translation of the two

TABLE I

Chinese weights		Metric equivalent		Apothecarian equivalent
1 Wherl	=	0.000037301 gram[6]	=	0.000575629032 grain
10 Wherl = 1 Ssu	=	0.000373010 gram	=	0.005756290320 grain
10 Ssu = 1 Hao	=	0.003730100 gram	=	0.057562903200 grain
10 Hao = 1 Li	=	0.037301000 gram	=	0.575629032000 grain
10 Li = 1 Fen	=	0.373010000 gram	=	5.756290320000 grain
10 Fen = 1 Chien	=	3.730100000 gram	=	57.562903200000 grain
10 Chien = 1 Liang	=	37.301000000 gram	=	575.629032000000 grain
16 Liang = 1 Chin (Catty)	=	596.816000000 gram	=	9210.064512000000 grain

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[6] These small figures are only nominal.

TABLE II

Chinese Weights	Actual values in grams	Correct values in grams	Difference in grams	Per cent of error
6 Fen	2.2350	2.2381	−0.0031	−0.14
8 Fen	3.0557	2.9841	+0.0716	+2.40
3 Chien	10.9633	11.1903	−0.2270	−2.03
6 Chien	22.4726	22.3806	+0.0920	+0.41
7 Chien	25.8404	26.1107	−0.2703	−1.04
8 Chien	29.9688	29.8408	+0.1280	+0.43
9 Chien	33.6978	33.5709	+0.1269	+0.38
1 Liang	37.2284	37.3010	−0.0726	−0.19
2 Liang	74.9980	74.6020	+0.3960	+0.53

prescriptions. He also wishes to express his gratitude to his former colleague, Dr. Carl F. Schmidt, for his valuable help and frank criticism in the presentation of this paper. For historical dates, botanical names, equivalents of Chinese weights, and so forth, the following books have been freely consulted:

Chinese Dictionary. Shanghai, 1915.

Botanical Nomenclature, Shanghai, 1917.

STUART, G. A. Chinese Materia Medica. Shanghai, 1911.

READ, B. E. Botanical, Chemical and Pharmacological Reference List. Peking, 1923.

KREMERS, E. A. Bibliographic Guide for Students of History of Pharmacy, University of Wisconsin, 1916.

STEPHEN HALES*

(1677–1761)

By G. E. BURGET

PORTLAND, ORE.

STEPHEN HALES was born at Bekesbourne in Kent, September 7, 1677, the sixth son of Thomas and Mary Hales. Only meager information is obtainable in regard to his early life and training. In 1696, at the age of nineteen, he entered Bennet College, Cambridge. Although we have no definite record we may assume that he applied himself earnestly to the study of religion and natural philosophy. He took a Bachelor of Arts degree and was elected to a fellowship about 1702. In 1703 he was granted a Master of Arts degree. William Stukeley (1687–1765) afterwards M.D., F.R.S., went to the college in 1704. A friendship arose between him and Hales although Hales was Stukeley's senior by ten years. From Francis Darwin we learn that these two college friends roamed the surrounding country together. Hales carried an often-thumbed copy of Ray's "Catalogue of Plants." Everything from fossils to butterflies was eagerly studied by the young philosophers. They dissected frogs, dogs and other animals together. John Francis Vigani (1650–1712) who became the first professor of chemistry at Cambridge in 1703, seems to have attracted them. In a room at Trinity College, the laboratory of Sir Isaac Newton, they repaired to repeat some of Boyle's experiments and to watch the demonstrations of Vigani. They prepared various substances, "some of use, some of curiosity." Hales studied astronomy. He knew well the Newtonian System. While yet in college he constructed a machine of brass to show the movements of all the planets. After having been in college some twelve years (1696–1708–9) we next hear of him being made perpetual curate of Teddington, about 1710. He took orders and in 1711 became a Bachelor of Divinity. The next fifty years, until his death in 1761, his home was in Teddington, Middlesex, where Alexander Pope was a friend and neighbor and Peg Woffington one of his parishioners.

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* Read before the University of Oregon Medical History Club, Portland, Ore., November 21, 1924.

STEPHEN HALES (1677–1761).

He was married to Mary, daughter and heiress of Dr. Newce, rector of Halisham, about the year 1719, the exact date is uncertain. Mary died two years later, 1721, leaving no children. He never married again.

Although we have none of his experimental data before 1719 there can be little doubt that Hales was busy, as evidenced by the fact of his election to the Royal Society in 1718. In 1719 he reported to the Society some recent experiments on the effect of the sun's warmth in raising the sap in trees. For this he received the thanks of the Society with encouragement to continue the research. This Hales did, reporting before the Society at different times, and in June, 1725, he gave an account of his progress in the form of a treatise. At the request of the Society the work was published in 1727 under the title of "Vegetable Staticks; or, an Account of Some Statical Experiments on the Sap in Vegetables; being an essay towards a Natural History Vegetation. Also a specimen of an attempt to analyse the air by a great variety of chymio-statical experiments, which were read at several meetings of the Royal Society." The work was well received and a second issue was published in 1731. The Society further honored him by making him a member of the council, 1727. Hans Sloane (1660–1753) was at that time president of the Society. Upon the death of Sloane, 1753, Hales was elected to the French Academy to fill his place.

"Vegetable Staticks," as the more elaborate title indicates, deals with the flow of sap in plants of various kinds and the effect of moisture, temperature and types of soil on the pressure under which sap rises. The mercury manometer was used for these determinations, which were always carefully and accurately worked out. The book contains many drawings which prove the ingenuity and care with which the experiments were conducted. In all there are 124 experiments, painstakingly recorded. They represent the original work on vegetable statics and opened at the time a new and fascinating field of plant physiology. Buffon (1707–1788), the French naturalist, translated the work into French. German and Italian translations soon followed. No doubt this work early fell into the hands of Linné (1707–1778), then a young man preparing his first work, "Systema Naturae" (1735). Sachs (1832–97), the well-known German botanist, writes that of the study of plant physiology that took place in the eighteenth century, the work of Hales was the most original and the most important contribution. In honor of Hales, John Ellis, whom Linnaeus termed "The bright star of Natural History," named a newly discovered genus, Halesia.

Intending at first only to make additional observations and experiments to the volume on "Vegetable Staticks" he found in 1733 that these had grown to the size of another volume. This he called "Haemastaticks," or Volume II of the "Statical Essays."

The following paragraphs give an insight into his purpose:

> As the animal Body consists not only of a wonderful texture of solid Parts, but also of a large proportion of Fluids, which are continually circulating and flowing, thro' an inimitable Embroidery of Blood-Vessels, and other inconceivably minute Canals: And as the healthy State of the Animal principally consists, in the maintaining of a due Equilibrium between those Solids and Fluids; it has, ever since the important Discovery of the Circulation of the Blood, been looked upon as a matter well worth the inquiring into, to find the Force and Velocity with which these Fluids are impelled; as a likely means to give a considerable Insight into the animal Oeconomy.
>
> It may not be improper here to take notice, that being about twenty-seven years since, reading the unsatisfactory conjectures of several, about the cause of muscular motion, it occurred to me, that by fixing tubes to the arteries of live animals, I might find pretty nearly, whether the blood, by its mere hydraulic energy, could have a sufficient force, by dilating the fibres of the acting muscles, and thereby shortening their lengths, to produce the great effects of muscular motion. And hence it was, as I mentioned in the preface to Vol. I, that I was insensibly led on from time to time into this large field of statical and other experiments.

He then proceeds to describe the classical experiments by which blood-pressure was first measured:

> In December I caused a mare to be tied down alive on her back; she was 14 hands high, and about 14 years of age; had a fistula on her withers, was neither very lean nor yet lusty; having laid open the left crural artery about three inches from her belly, I inserted into it a brass pipe whose bore was one-sixth of an inch in diameter, and to that, by means of another brass pipe which was fitly adapted to it, I fixed a glass tube, of nearly the same diameter, which was nine feet in length: then untying the ligature of the artery, the blood rose in the tube 8 feet 3 inches perpendicular above the level of the left ventricle of the heart; . . . when it was at its full height, it would rise and fall at and after each pulse 2, 3 or 4 inches; . . . Then I took away the glass tube, and let the blood from the artery mount up in open air, when the greatest height of it's jet was not above 2 feet.
>
> I measured the blood as it ran out of the artery, and after each quart was run out, I refixed the glass tube to the artery to see how much force the blood was abated; this I repeated to the 8th quart, and then its force being much abated, I applied the glass tube after each pint had flowed out.

Three horses in all were used in this manner, all of which were to have been killed as unfit for service. From one of the horses he measured the blood lost by bleeding and after adding the probable amount in the large veins estimated the total as five wine gallons, which he recognized as low, remarking that: "There is doubtless considerably more, but it is not easy to determine how much." The jugular pressure in one of the horses he found to be twelve inches when quiet, but this rose to fifty-two inches when the animal struggled.

Experiments similar to these were done on sheep and dogs and he says: "Whatever experiment I principally intended to make on any dog, I usually began with fixing a tube first to the jugular vein and then to the carotid artery."

He filled a number of hearts with melted wax, later cutting away the tissue and estimating carefully the inner surface of the ventricles. Knowing the volume and inner surface of the ventricles, the blood pressure, heart rate, the diameter of the aortic orifice and of the aorta itself, he calculated for horses and various other animals including man, the mean velocity of the blood in the aorta, the velocity of the systolic output and the pressure sustained by the heart during contraction. Although we now know such an estimate would be more or less inaccurate, nevertheless this carried the study of the circulatory system beyond Harvey's work and introduced the method of quantitative investigation. Hales himself appreciated the complexity of the situation regarding the velocity. He says:

> Now this velocity is only the velocity of the blood at its first entering into the aorta, in the time of the systole; in consequence of which the blood in the arteries, being forcibly propelled, with an accelerated impetus, thereby dilates the canal of the arteries, which begin to contract at the instant the systole ceases; by which curious artifice of nature the blood is carried on to the finer capillaries, with an almost even tenor of velocity, in the same manner as the spouting water of some fire engines is contrived to flow with a more even velocity, notwithstanding the alternate systoles and diastoles of the rising and falling embolus or force . . .
>
> For tho' the velocity of the blood at its first entrance into the aorta, depends on the proportion the area of its orifice bears to the quantity thrown into it at each systole, and also on the number of these systoles in a given time; yet the real force of the blood in the arteries, depends upon the proportion which the quantity of the blood thrown out of the left ventricle in a given time, bears to the quantity which can pass thro' the capillary arteries, into the veins in that time.

He showed where the greatest resistance to the blood existed by slitting a dog's gut opposite the mesentery and running warm water through from the aorta. The time was recorded for a given amount of water to make its escape in this manner. The vessels in the mesentery were then cut and the time for the escape of the same quantity of water was reduced from six to two minutes. By calculating, he found that this resistance must be greater in the intact animal and accounted for this difference by:

1. The greater fluidity of water as compared with blood.
2. The absence of the back pressure of the veins in one case and its presence in the other.
3. The greater distensibility of the dead a teries.
4. In the case of the slit gut the fluid is no longer obliged to pass through the fine capillaries but runs out through the larger vessels which have been severed.

He appreciated the fact that end pressures are necessarily too high and devised a scheme by which the vessels were placed between two grooved pieces of wood which were later cemented together and to the vessels by means of warm pitch. Through a hole bored in one of the pieces of wood he punctured the vessel, screwed a tube in the hole and allowed the blood to mount into it.

The effects of different substances upon the caliber of the "capillary arteries" were studied. His own description is most interesting:

> I took a young spaniel dog, opened his thorax and abdomen, and having fixed a glass tube which was 4 and ½ feet high, to the descending aorta, I then slit open his guts, from end to end. Then having poured blood warm water on them, and covered them with a folded cloth dipped in the same water, warm water was poured into the tunnel (attached to the tube) which when it had subsided to a mark on the lower part of the glass tunnel 18 cubick inches of warm water were immediately poured in, out of a pot which held just that quantity; the time it was running through the fine capillary arteries was measured by a pendulum that beat seconds . . .
>
> I then poured on seven pots full of warm water, the first of which gradually passed off in 52 seconds, and the remaining six gradually in less time to the last, which passed in 46 seconds.
>
> I then poured in five pots of common brandy or unrectified spirit of malt, the first of which was 68″ in passing, the last 72″.
>
> I then poured in a pot of warm water which was 54″ in passing.
>
> Hence we see that brandy contracts the fine capillary arteries of the guts, and that water soon relaxes them again.

A decoction of Peruvian bark contracted the vessels. A decoction of camomel flowers caused some constriction but not so much as cinnamon-water, with which the constriction was very marked. Pyremont water was also very effective.

He thought that these experiments indicated the probable action of these substances in the living body but understood that no such concentration was probably present in the living organism. His comment is:

> 'Tis probable that such things as constringe the vessels in any degree, do also proportionately increase the force of the arterial blood and thereby invigorate the animal. But those who much accustom themselves to drink strong spirituous liquors, do thereby destroy the tone of the fibres of their vessels, by having them thus frequently, suddenly contracted, and so soon relaxed again; which makes them like the horse-leech, be ever longing after and thirsting for more and more thereby to regain the tensity of their too relaxed fibres.

Man's blood-pressure he estimated as about seven and one-half feet. Although this is a little high we marvel that he was able to approximate it so closely.

He decided to test further the theory that muscular contraction was brought about by force of the blood dilating the muscle fibers. He soon felt convinced, however, that its force was incapable of producing so great an effect as muscular motion. A more vigorous and active energy whose force is regulated by the nerves seemed to him necessary. "But whether," he adds, "it be confined in canals within the nerves or acts along their surfaces like electrical power is not easy to determine."

Although his work indicated that he had a faint idea of the real process of digestion, his experiments were in no wise framed to the end that Spallanzani's were, a half century later. Hales, after making many hydrostatic experiments on the stomach and intestine concluded:

> So small a compressure can have very little effect in prompting the digestion of the aliments: which is therefore with good reason principally attributed to the concurrence of several other causes; such as mastication and comminution with the teeth, and mixture first with saliva (which is a leaven full of elastic air) and afterwards with the fluid, which is in plenty separated from the glands of the stomach.

Robert Boyle (1627–1691) made experiments with flames and animals *in vacuo* (1660), demonstrating that air is necessary for life as well as for combustion. Robert Hooke (1635–1703) in 1667 showed by blowing a stream of air through the exposed lung of an animal it could be kept alive without movement of chest or lungs. Blood changes were thus indicated. Two years later, 1669, Richard Lower of Cornwall (1631–1691), to whom is ascribed the first blood transfusion in the human (1668), injected dark venous blood into the insufflated lungs and as it became bright he concluded it was by reason of its having absorbed something from the air. Mayow (1643–1679) termed this substance taken from the air nitro-aerial spirit of air. Malpighi (1628–1694) had demonstrated capillary circulation in 1660 and published his "De Pulmonibus," 1661, describing how the trachea terminates in bronchial filaments. These men were pioneers in the study of respiration and their findings do not represent the common knowledge or lack of knowledge of this subject. Hales was still in doubt. He speaks of "plenty of fresh air, that genuine cordial of life." He stands between these men and those of the next generation who contributed so much to the development of our knowledge of this subject, Joseph Black[1] (1728–1799), Priestley (1733–1804), Laplace (1749–1827), Lagrange (1736–1813) and Spallanzani (1729–1799).

Hales had the exact amount of refrigeration action of the lungs calculated after having determined the quantity of blood passing through the lungs per minute, the amount of air breathed during the same time, and the difference in temperature of the inspired and expired air. This was found to be enough in two minutes to raise all the blood of the body 0.101928 degrees. He describes carefully the circulation of the lungs. He showed that air in the blood-

[1] He says in his remarks on fixed air: "For I found, that by blowing through a pipe into lime-water, or a solution of caustic alkali, the lime was precipitated, and the alkali was rendered mild. I was partly led to these experiments by some observations of Dr. Hales, in which he says, that breathing through diaphragms of cloth dipped in alkaline solution made the air last longer for the purposes of life."

vessels was fatal; that one side of the thorax might be opened without danger to the animal, but evidently did not recognize the negative pressure there. He calculated the quantity of moisture carried off by respiration. Finally he concludes his discussion of the functions of the lungs with this statement:

> It is probable also that the blood may in the lungs receive some other important influences from the air, which is in such great quantities inspired into them. It has long been the subject of inquiry of many, to find of what use it is in respiration, which tho' it may in some respects be known, yet it must be confessed that we are still much in the dark about it.

In 1739 he was granted the Copley medal and the same year appeared "Philosophical Experiments" with the following title page:

> PHILOSOPHICAL EXPERIMENTS
> containing
> Useful, and Necessary Instructions for such as undertake long Voyages at Sea.
> Shewing how sea-water may be made Fresh and Wholsome: And how Fresh-water may be preserved sweet.
> How Biscuit, Corn, etc., may be secured from the Weevel, Maggots, and other Insects.
> And Flesh preserv'd in hot climates, by salting animals whole.
> To which is added
> An account of several experiments and observations on Chalybeate or Steel-Waters: With some attempts to convey them to distant places, preserving their Virtue to a Greater Degree than had hitherto been done.
> Likewise a Proposal for cleaning away Mud, etc. out of Rivers, Harbours and Reservoirs.
> Which were read before the Royal Society, at several of their Meetings.
> By STEPHEN HALES, D. D., F. R. S.
> Rector of Farrington in Hampshire, and Minister of Teddington, Middlesex.
> LONDON
> Printed for W. Innys and R. Manby, at the West end of St. Pauls; and T. Woodward, at the Half-Moon between the Temple-Gates, in Fleet-Street.
> MDCCXXXIX

The practical side of these experiments is obvious. Hales was ever conscious that he was not a physician and upon matters clinical he was very careful of his statements. He had the greatest respect for physicians but for quacks he had no sympathy. The following quotation from this volume leaves no doubt of his position and gives us some indication of the amount of quackery in England in the eighteenth century:

> Did I indeed hereby seek only popular applause and not the real benefit of Mankind; the more ignorant I was in Physick, the better chance I should have, to be much cryed up by the unknowing Many: The Truth of this, we may have had full proof of, of late Years, in the Instances of several most ignorant Quacks; who have in their turns had a more general Cry of Applause given them, than has come to the share of the most eminent and skilful Physicians, with many of which that Faculty abounds. But the Physicians may well be content to take this contempt more patiently, when they reflect that a petulant fondness for Quackery is the epidemical Disease of this Age; not only in opposition to theirs, but also to other Professions.

In May, 1741, he read before the Royal Society an account of a method for ventilating ships. In November of the same year Cromwell Mortimer, M.D., secretary of the Royal Society, had a letter from Martin Triewald, F.R.S., captain of mechanics and military architect to the King of Sweden, saying that in the past spring he had invented a machine for the use of his Majesty's men-of-war in order to draw out all bad air from under their decks. His treatise was laid before the Royal Academy of Sweden, April 3, 1742, eleven months after Hales' plan was laid before the Royal Society. Neither knew of the work of the other, yet their plans were almost identical. Each consisted of a box-like bellows for drawing out the foul air. They were eventually adopted by all the nations having sea-going vessels. Vessels carrying African negroes to the United States, for example, often lost as much as twenty-five per cent of their cargo. This loss was reduced to five per cent or less. One French vessel saved 308 out of 312 slaves in spite of a most tedious calm and a long voyage.

In April, 1752, ventilators were fixed in Newgate prison. These were operated by a windmill. The death rate was reduced in this prison by the one measure alone from eight to two per month. Other prisons adopted the method of ventilating used at Newgate. Louis XV was persuaded to introduce this system of ventilating into the French prisons in which British soldiers were confined. On this occasion Hales is credited with saying: "He hoped nobody would inform against him for corresponding with the enemy." The ventilator was found very useful in aerating granaries to prevent the grain from spoiling.

Among the many other tracts by Hales was one entitled, "A Friendly Admonition to Drinkers of Brandy and other Distilled Spirits," which was widely distributed even many years after his death. A few of the titles taken from the *Philosophical Transactions of the Royal Society* are: "A Proposal to Bring Small Passable Stones Soon and with Ease out of the Bladder"[2]; "Remarks concerning Some Electrical Experiments"[3]; "Of the Strength of Several of the Principal Purging Waters, Especially That of Jessop's Well"[4]; "Of Some Trials to Keep Water and Fish Sweet, with Limewater,"[5] and "A Description of a Sea Gage, to Measure Unfathomable Depths."[6]

Hales was familiar with Franklin's experiments with electricity. When he was contriving a means to abate hurricanes by exploding the sulphurous air (the collection of which he thought the cause) by shooting bombs or grenades into the air, he says: "In Pennsylvania, Mr. Franklin having fixed a vessel of spirit of wine and iron wire to the tail of a kite, the spirit of wine was fixed in a sulphurous and consequently a highly electrical state of the air." He studied earthquakes and ascribed to them the same cause, volcanic sulphurous charged air. In this consideration he quotes Buffon and Borelli. About Lord Berkeley's "Tar Water" he had little to say; however, he thought it beneficial in murrain among cattle.

Hales was ever faithful to his mission as a minister. His flock always had his solicitude. He helped them to get a supply of good water (1754). He enlarged the church yard "by prevailing upon the lord of the manor." He aided his parishioners in the construction of a lantern on the church (1748). Later (1754) the timber tower on which the lantern stood was torn down and a brick one put in its place, a large share of the cost of which he himself bore. Under this tower his bones rest in accordance with his request.

Regarding his personality; we have the following remark from Pope: "I shall be very glad to see Dr. Hales, and always love to see him; he is so worthy and good a man."

Others spoke of "his constant sincerity and cheerfulness of mind." The wicked he "considered only like those experiments which upon trial, he found could never be applied to any useful purpose, and which he therefore calmly and dispassionately laid aside."

In a trembling hand his signature appears on the parish register for the last time in November, 1760. After a short illness, the nature of which we do not know, he died January 4, 1761. The *Gentlemen's Magazine* of that date writes in part:

> On Sunday the 4th instant, died, at his parsonage-house at Teddington, universally lamented, in the 83rd year of his age, the Rev. Dr. Stephen Hales, F.R.S., member of the royal academy of sciences of Paris and clerk of the closet to her Royal Highness the Princess Dowager of Wales. If any man might ever be said to have devoted his whole life to the public, to all mankind, it was Dr. Hales.

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[2] *Phil. Tr.*, Lond., IX, 159.

[3] *Ibid.*, IX, 543.

[4] *Ibid.*, X, 48.

[5] *Ibid.*, X, 551.

[6] *Gentleman's Magazine*, May, 1754, XXIV, 215.

Hales' philosophy was of the most practical type. He enjoyed his work because of the benefit he might be able to render his fellow men. It was not solely a pastime to him. In the dedication to his book on ventilators[7] we find this:

> The study of natural philosophy is not a mere trifling amusement as some are apt to imagine; for it not only delights the mind, and gives it the most agreeable entertainment in seeing in everything the Wisdom of the great Architect of Nature: But it is also the most likely means to make the gift of kind providence to us by teaching us how to avoid what is hurtful and to pursue what is most useful and beneficial to us.

Again in the introduction to "Haemastaticks" we read:

> In natural philosophy, we cannot depend on any mere Speculations of the Mind; we can only with Mathematicians reason with any tolerable Certainty from proper Data, such as arise from the united Testimony of many good and credible Experiments.
>
> Yet it seems not unreasonable on the other hand tho' not far to indulge yet to carry our Reasonings a little further than the plain Evidence of Experiments will warrant; since at the utmost boundaries of those Things which we clearly know, there is a kind of Twilight cast from what we know, on the adjoining Border of Terra incognita, it seems therefore reasonable in some degree to indulge Conjecture there; otherwise we should make very slow Advances in future Discoveries, either by Experiments or Reasoning.

A clergyman of the church of England, not having taken a medical degree nor having studied medicine, Hales stands out a unique figure in medical history. He drank deep of his religion and in it he saw nothing that would obstruct the progress of man and his civilization. In him there was perfect blending of religion, philosophy and science. In breadth of detail and accuracy of investigative procedure he stands unparalleled. His work was always quantitative. Hygiene and sanitary engineering made marked advances by his efforts. He is the undisputed father of the science of hemodynamics, a contribution which gives him rank with Harvey in the history of physiology.

In Westminister Abbey there stands a monument erected in his memory by the Princess of Wales. On the tablet at the old church in Teddington is this inscription:

> Here is interred the body of Stephen Hales, D.D., clerk of the closet to the Princess of Wales, who was minister in this parish 51 years. He died the 4th of January, 1761, in the 84th year of his age.

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A MEDICAL ESSAY ON THE TIMAEUS

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ONE cannot read Aristotle without being struck with the part the philosophy he ascribes to Empedocles plays in much of his discourse. While this is very much less true for Plato, nevertheless it comes into prominence in the "Timaeus." In Plato, much more than in Aristotle, we find the sources of his thought not specifically referred to; but here in the "Timaeus," when we find the creator of the world has the four elements: air, fire, water, earth, from which to shape the universe, we remember that Aristotle (though others also) points to Empedocles as the originator of the doctrine, at least as the one who gave it its earliest and greatest development. Thus at this place in the "Timaeus" we find Plato drawing on the idea characteristic of Empedocles, when he says that God mixed all these together, "which are in number four and out of these elements the world was created in harmony and therefore having the spirit of friendship." The last has the indubitable imprint of Empedocles. It is the primordial symbolizaton of the fundamental physicochemical forces of the cosmos, Love and Hate, that is, the attraction and repulsion of the old chemistry, the plus and minus signs of the old electrophysics, the kation and anion of the newer chemistry, the proton and the electron whirling around it in the new physics. It still rules the biochemistry of modern science.

It is true Plato subsequently says the soul was created first, but in the making of the world the Creator in the "Timaeus" used all the elements up. There was nothing of them left when he got through. The world was to be a perfect animal and have neither disease nor old age. Inasmuch as man suffers from the impact of his environment, we must remember the ills to which flesh is heir. It could not be thus with a world fresh from the hands of a perfect Workman. All the environment was used up in the perfect globe He made out of it. It is the pleasure of Plato here to speak of the world in the terms of an animal. The Demiurge made the globe smooth all around and gave him no eyes, for what was there to see if everything was used up, or to hear or feel? No use for the senses at all; no respiration for there was nothing to respire; no need of food, for every thing was in him and nothing came from him; no legs, for he had no place to go; no arms; no implements for he had nothing to use them on; very singular animal, this. This animal the Creator created was self-sufficient and had no need for bodily organs. I suspect Plato is joking, ridiculing a doctrine of some one before him, but the idea persisted long after him, chiefly through him.

The world is thus the child of God and by virtue of this heritage becomes a god, while in representing the world as an animal Plato may be ridiculing or bowing to the Pythagoreans or the Egyptians, for to the latter very many animals are divine. They are the caskets of the divine spirit and the modern societies for the care of animals are the offspring of that sentiment, which in eastern lands, modern India and ancient Egypt, has been and still is a religious cult. Perhaps Plato was not joking, but it is not hard to conjecture whence he borrowed the fantastic simile to an animal for something that is in no way similar to an animal. Whether joking or not the idea is essentially pantheistic and mysticism pervades the whole of it. It makes everything possible. It is vastly superior to Aristotle's entelechy, for that is always a special application of a mystic principle in physiological action which Plato virtually makes universal. He endows the world with a soul, but what he makes it out of when the material is all used up is the first thing that occurs to the reader; then he remembers it is immaterial anyhow, but Plato catches himself up as though he had forgotten to mention that God made the world soul first. It may well be that went without saying, for Plato had as the cardinal point in his philosophy that the idea of all things that are existed before the things themselves. There seems (to the ordinary man even) no escape from this except to imagine a demiurge who worked without plan or specifications from any architect, and it takes much more than the ordinary man to fathom the depths of Plato's thought in the "Timaeus."

However we are getting a good way, on the track of this animal, from medical interests, and this, the thing we scientists as materialists all shy at, gives us warning it is time to get back to them. Very probably it was from or through Parmenides, as Robin says,[1] that Plato had the idea of the sphere being the most perfect work of God, but that tenet of Pythagorean doctrine was apparently widespread in Plato's day. God makes the world spherical, like an ameba at rest, wanting nothing, seeking nothing and therefore devoid of anything Plato would call organs and senses and we have to invent an incomprehensible term for them, the irritability of protoplasm. With the help of Darwin and Haeckel and Conklin we have all sprung away from something as near as we can imagine to Plato's idea of the world. There is vastly more than this to Plato's conception of the creation of the world by God's demiurge. He goes into the matter in vastly more detail than the author of the first chapter of Genesis, whose demiurge seems to have spent the first week chiefly in naming things. The ideas, if not the names, were ready made and at hand for the demiurge of Plato's God. He on the contrary is a very busy god and the reasons for his actions are even more minutely described than his methods. But we can pause no longer and must pass directly to the latter part of the "Timaeus," where the physiology and pathology of man are dealt with, though we must always remember that in Plato's cosmos the reasons for things, like the ideas, take precedence of the processes in which they are involved. We forget that Plato really forged the word *idea* for us and we have perverted its original meaning in so far that no conception of "form" clings to it. There was that much of materialism to Plato's ideas. They were forms, though images of the mind, and the word came from a root meaning something you can see. It was an order of thought which forced the reason for things to the fore and placed the things themselves in the rear. The corporeal had only then begun to be separated from the incorporeal in conception, the material from the immaterial. Modern primitive man still does not know the difference.

This is the teleology which we find Plato applying constantly to man as a part of the cosmos, and Galen, who was as much the pupil of Plato in this as he was of Hippocrates in medical science, passed on this teleology with its minutiae, much more worked out in detail, to fifty generations of medical men after him. The history of medicine during this long dreary time after Galen is the history of the lasting influence of the teleological doctrine of Plato. When his kind of man came to be manufactured, the legs and arms were for practicing motions in the six directions space had for Plato. It extended to right and left, up and down, forward and back, a purely anthropological conception, with man at the center. We dismissed the purely anthropological concept long ago and reduced directions to three, but lately a fourth dimension has been added with which we are hardly as yet on speaking terms. The gods thought the front part of man more honorable than his hinder parts and the dome of the calvarium nearer heaven, and they gave him a forward motion. The eyes were contrived to give light as a sort of reflection of the pure fire within us all. Like that of the firefly we are to suppose it was moderated so as not to burn, the cold light whose mystery we have not solved, at least not succeeded in duplicating. It is, we acknowledge, a very superior and economical kind of light which even yet God alone makes and which we cannot even imitate very closely. Of course I have not found this analogy in Plato, but we can let it go in support of his theory of a light-producing source in man, and perhaps he too was reminded of it by the fireflies or glowworms somewhere around the Mediterranean shores.

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[1] Robin, L. La Pensée Grecque, et les origines de l'esprit scientifique. Paris, 1923.

This notion of luminiferous particles flying from the eyes to the objects of vision, we find in a considerable fragment of the poem of Empedocles. It is certainly a strange theory, a queer idea held so long without more support of suggestion, and my own feeble reference to the firefly does little to explain it. Flying particles were in the air of nature philosophers, perhaps earlier than Empedocles, at least as early as Leucippus. They surround us today, but these of Empedocles which Plato adopts for us were going in the wrong direction to be even prophetic of our corpuscular theory of light. However, they flew from the object too. This ancient fire of the soul shed forth its light from the eye and when it met the light from the object, or rather when corpuscle met corpuscle, *voilà*, the sensation of light, like meeting like in conformity with Empedoclean doctrine. Plato thought with this explanation there was no difficulty in understanding the images seen in mirrors. They all came from the light of the eye meeting the light of the day. To epitomize even his explanation of the distortion of the image in concave and convex mirrors, placed vertically or horizontally, is not profitable. Though we see Plato confronted here with the phenomena of the reflection and refraction of light and though we pick up a corpuscular theory in his remarks and see him borrowing something, or his predecessor borrowing something, from the firefly perhaps, on the whole the approximation to what we think to be the truth is not at all marked.

In the process of explaining how the soul of the world shapes the world which contains it (a very dark corner indeed of the "Timaeus") Plato begins at once with the elements as they are, though he is in full possession of the idea his predecessors have of their transmutation. He shows how any one may be seen to be converted into another. It is needless to mention how water turns into ice which has the hardness of the earth. Water turns into fire, but fire, through its affinity to ether or air (a relationship in itself it is a little hard to trace), must in some way be related to vapor. It is perhaps here we get the drift of ancient thought coasting the unplumbed shore of natural phenomena, the vapor arising from the sea curling up in the morning as the central fire comes reflected across the sea, the vapor tumbling into the air as the fire grows hot beneath the kettle. We are beginning now to have our own ideas of the transmutation of the elements, after treating the alchemists to ridicule and contempt for centuries almost. When Plato briefly tells us how water changes its form, remembering our former arrogant and foolish attitude toward alchemy we agree for the sake of the argument that land as well as vapor may arise from it. Who knows what form earth or land may once have had? We can have no objections when we remember we can make something very much like fire out of the oxygen and hydrogen of the water. Looking at the stars we conjecture earth may once have been fire and it is quite possible it may be fire again. To all this speculation of the ancients and strivings of the alchemists which flowed from Platonic theories, from the declaration of Thales that all things were once water, we may now lend a more patient and chastened ear than a few decades ago. The history of science is the history of error and arrogance quite as much as of achievement and self-sacrifice.

When, however, we find him on the trail of the indivisible (let us call it now an electron, not an atom—that indivisible has long since been divided), to which he is going to add something to distinguish a certain part of it, we at once rebel at this violation of logic. However, Sir Joseph split the atom, whose very name told us it could not be cut in two. If the indivisible has certain parts it is no sophistry to say the assertion parts it in two or more. Plato has his contradictions and I step over the line into something very like sophistry at least in following this trail of Plato in the "Timaeus," excusable, I hope, for here Plato is pursuing his inquiry into the nature of sight, which no one will deny belongs to medical interests.

One seeks medical interests in Plato at this risk constantly. One is ever lured into blind alleys of metaphysics as one searches in his works for traces of physics. When he reminds us that self-existent ideas are unperceived by sense and apprehended only by the mind we feel we are indeed on shaking ground, but Plato assures us to the contrary. What we perceive by the mind we know, for the mind is a part of the Divine Soul. We see the red flag of conflict between science and religion flicker at this distance across the ages, but the further assertion, that what is perceived by sense is apprehended by opinion only, and opinions vary, has implications which interest us in psychology at least. Visions have been traced to certain distortions of the crystalline lens. Smell and taste have their vagaries and hearing its subjective noises, and we know well that medical men can bring this testimony to the doctrine of Protagoras that man is the measure of all things; but ordinary men know at least that tastes differ. Opinions differ as to questions of sense apperception, Plato says, and we see how quickly we are involved in matters far beyond our domain.

As a matter of fact it is quite impossible to discuss the medicine or physics of Plato without understanding, so far as it is comprehensible, his metaphysics also. This is especially true of the "Timaeus." From the discourse there reported there emerges much which is found in the ancient history of science not appearing elsewhere. Water is H_2O for us, but even on this definitely limited conception we are disposed to acknowledge that even ice can be transformed into it and, if you will, into fire. We have been playing tricks with our elements too. We see, however, in studying Plato, how widely we must vary our conceptions of "elements" and even of water. For Plato there were numerous kinds of water, which mingle with our chemically pure concept, and among them those kinds distilled by plants, the juices or saps. The unequal admixture of these fluids creates a variety of species in the plant world. Although Professor Jennings[2] has given us a most refreshing and delightful epitome of his conception of species and a scarcely less gratifying sense of delight in the way in which he manages to pay his respects to Mendelian follies, we are in an epoch of biology when the chief emphasis is laid upon the influence of heredity, pure and simple. We see in Plato the profound influence of the environment as brought to the notice of the ancient world by the nature philosophers. It finds wonderful expression in the "Airs, Waters and Places" of Hippocrates, ignoring the intervention of the germ-plasm as a chance and temporary intruding factor, the ultimate result depending on the impact of the elements, air, water, earth and fire or heat, and their interactions.

As to the species there are those of plants producing wine which warms body and soul, oil, smooth and dividing light (with its high index of refraction) and those producing sweetness. We see how the idea of species too is built on teleological tendencies and how widely they differ from our own, as widely as the elements and our idea of water. I use Jowett's translation: "And lastly there is opium and it differs from all other juices and is a frothy liquid, having a burning quality which dissolves the flesh." I am not familiar with any earlier mention which is more likely to refer to this drug, but on looking at the text the word ὀπὸς as it stands suggests opium, it is true, although it may have been any other pungent juice as well, as far as the description goes. Still there is no denying our word opium comes from this one in Greek and soporifics were known to the ancients. The "moly" of Homer was one, presumably. Plato may have had poppy juice in mind, but there is no assurance of that fact from the text; he seems rather to use it in the generic sense of a thick liquid exuding from plants, for he says in the separation of water; "there may occur substances compounded of finer particles of earth and then a half solid body is formed, soluble in water, either nitre which is used for purifying oil, or else salt, dear to the gods."

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[2] Jennings, H. S. *Scientific Monthly*. September, 1924.

He was dealing here with crystallization, but when he deals with evaporation and boiling he occasionally falls, like the rest of us, into tautology. How rudimentary were the ideas in regard to heat, for so we must translate "fire" more often than not, we see in the remark: "The cohesion of water when very strong is dissolved by fire only. When weaker then by fire and air." He has in mind, without doubt, the observation of the nature philosophers on the transmutations of the elements, for the name of Thales was well known to the Athenians, as we may judge from the casual reference to him in the "Birds" of Aristophanes. The crystallization of salt out of the ocean, the emergence of sand bars from sedimentation, were the phenomena which testified to this as we see here in the "Timaeus," and the hardening of the sap into a gum or solid coming from a plant like the poppy was on a level with the salt and mud yield from the ocean. It too might have been an example of the transmutation of water. In this general sense and in this connection the word is used. It may have been opium or some other acrid juice, in more northern climes turpentine.

We have been taught by modern psychology that pain, by habit or force of will or by some other psychic influence, sinks more or less into the subconsciousness of many individuals, who recognize they have been in pain as much by the sensation of pleasure which follows its banishment as by its actual incidence. We strike here a philosophy of contrasts familiar to ancient philosophy and valid in the currency of our own. Things are only recognized by the existence of their opposites. If Theophrastus was not mistaken, this idea was first given to the world by Alcmaeon. At least it is implicit in the doctrine of the humors in the apposition of their qualities, the hot and the cold, the moist and the dry. The best solution of the mystery of evil the deist finds is that but for evil we would have no conception of the good. So the apperception of sense may be thought of as falling in the same category, although Empedocles apparently brought it into line with his attraction of similars to similars. The variation of feelings of discomfort and well-being depends largely on imponderables. I am inclined to think that is the fact which the penetration of Plato's mind observed in the sensations of disease, though I confess to uncertainty. At any rate we gather very easily something very analogous to it in the remark that gradually increasing sensation of pain gives no notice to the mind of its existence and its gradual withdrawal no pleasure. Some of the confusion in the modern reader's mind is due here to a lack of objectiveness in Plato which science is still very far from supplying. We would hardly speak of sensation as imperceptible, but we are able to think of distal molecular disturbance at times as not registered in consciousness. After all this is only our fashion of speech, for we do not really know anything about molecular disturbance at the periphery of sense organs or, for that matter, at their centers, but the fashion is a convenient one which Plato did not have at his service. It is remarkable that without it he arrived as near to the observation as he did; sometimes he declares there is a sensation not perceived.

It is astonishing to find following on such an acute exposition his discourses on the mechanism of the senses proper. We get no hint he knew of the cerebral nerves from Alcmaeon and we may well doubt how much the latter is to be credited with any conception of their function. Plato's theory of sense perception is largely that of Democritus, whom, however, he never mentions, nor Leucippus. He rejected or rather ignored the atomism of these philosophers and in the place of the atoms he substituted his minute triangles. Sensation is a matter of peculiar composition and division, but largely it is roughness and smoothness which excites the sense of taste and likewise of the other senses, but from the "Philebus," as Beare points out, we perceive there is a motion involved, which when the soul perceives it, the soul standing here for our consciousness, causes pain or pleasure. So his triangles like the atoms of Democritus were in motion. Now it is awkward for us to think or try to think of motion with nothing moved, but we have reached a familiarity with energy per se which was not an acquisition of the early Greeks, the more to their credit, some of us may think. As to taste Plato says: "Whenever earthy particles enter the small veins, which are the testing instruments of the tongue connected with the heart, and fall upon the most delicate parts of the flesh, when by process of meeting they contract and dry up the little veins, they are astringent if rougher, but if not so rough they are only harsh."

It is tedious to repeat the mention of the properties of the various bodies exciting the different kinds of tastes, the sharpness of the angles of his triangles has something to do with it. Indeed one suspects the puckering of astringent savors set him, or some one he copies from, on the wrong tack and while the same erroneous reasoning is found in the atomic theory of Democritus, we must not miss that the sensation of taste is led to the heart. I doubt if many of us are in a position to deny it is the shape of the molecules which gives acidity or other characters to taste, but that sensation is led to the heart we are prepared at first most emphatically to deny. Emotion, however, quickens the pace of the heart and emotion is the product of the revelations of the senses. These travel around by way of the brain, picking up much in the way of by-products there, but if we once get an idea in our heads that the central station is located at the crossing of travel of the blood currents, as Aristotle more emphatically had, it is difficult to get rid of it. The action of mind in matters non-emotional, judgment, justice, prudence, all these Plato found with affinities to the divine and he placed their seat in the brain, the Acropolis of the system of man, but the noble emotions and desires he located in the heart, the base ones in the liver. There is better reason to believe this was the teaching of Alcmaeon, than that he traced the cerebral nerves to their origin by dissection. It is difficult anyhow to see how particles of taste in the passage I have quoted from Plato should, with his views, be on their way to the heart. I cannot see how the gustatory sense can consistently sit in the heart. Man's natural tendency is to gluttony and its servant surely is the gustatory sense. Inasmuch as it is this which is for Plato the largest factor in the etiology of disease, the quality and the quantity, especially the excess of the food, inasmuch as he declares that if the bowels were straight and the food passed more rapidly there would be more gluttony still, the liver would seem to be the proper seat for the interpretation of taste. I have forgotten why it is we should get along better without a colon, but it was Plato's idea the intestines which lead into it are a safeguard to health because of their tortuosity. Certainly however, of all low desires the craving for useless quantities of food and drink is one of the basest and its seat should be in the liver where it would find that part of the tripartite soul most capable of differentiating tastes.

The veins and arteries were not differentiated; the nerves were not discovered, unless it be the cerebral nerves by Alcmaeon, and Plato is oblivious to this, as he quite evidently is to the atomic theory of Leucippus and Democritus. That he knew of the latter, it is not hard to see, that he did not know of, if it existed, the discovery of Alcmaeon seems probable, but we need not plume ourselves on a superiority over Plato as to our knowledge of how the apperceptions of sense are transferred to our consciousness. As to that, despite our infinitely better anatomical and physiological knowledge we know as little as he. We find him strangely remiss in referring low appetites to the heart instead of to the liver, but man is a mixture of puerilities and sublimities and Plato was a man and not a god.

It would take careful study and analysis to follow the thread of Plato's thought as to sensation into Galenic physiology, but there it quite evidently leads. I do not care to undertake such an analysis here, but if any one will compare the discourse in Galen's "Organ of Smell" to the passage in the "Timaeus," I think the connection will be quite apparent. In the "Timaeus" we read: "When there is any obstruction to the respiration and a man draws in his breath forcibly, then no smell filters through, but the air without the smell penetrates." Hence all smells are thinner than water and thicker than air. Aristotle had his way of evolving structure out of these deductions of Plato and Galen had another, and the latter combats the idea of Aristotle most vigorously. Although both are in error, owing to this way of studying anatomical structure and physiological function, we find the order of thought from which both sprang in the "Timaeus." For all three it was some ingredient of the air carried through the cribriform plate to the ventricles of the brain. It is difficult to see how Plato admits the odor to these precincts, but Galen had to invent an inspiratory and an expiratory function for the ventricles. If the facts of Alcmaeon's demonstrations of the functions of the cerebral nerves were known to Plato and Aristotle here certainly was the chance to employ them. How could vaporous smell rise through the cribriform plate, even if the holes were as patent as they are in the dried specimen, or vapors get their exit through the coronary sutures? As I have said the greatest minds have their puerilities. Galen had many of them. As to this he rested on the authority of Plato and Hippocrates and Aristotle, but why did these earlier and more original thinkers miss the way?

Galen made the heart the origin of the arteries and the liver the origin of the veins, we may be allowed to conjecture, at the bidding of Plato, for the convenience of his tripartite soul. Plato in declaring the heart the source of the veins was speaking before the arteries were differentiated from them and it would have seemed capricious then to have led some from the liver and some from the heart; so, we may assume, Plato forgets himself enough to send the particles of taste to the heart for recognition instead of to the liver, the natural seat of his ignoble passions. This might have been so, but Galen comes to his help by arranging the veins as having their source in the liver and the arteries in the heart. The circulation being hopelessly deranged, what is more natural than for the blue lingual veins beneath the tongue to seek the liver with particles of taste in the time of Plato? But in the time of Galen it was different, and though Galen discusses[3] these passages in the "Timaeus" as to sensation, he says nothing about the particles of taste going to the heart or the liver either, but he insists that smell and taste are congeners. As smell evidently goes to the ventricles of the brain even for Plato, one would think Galen would have mentioned it, had there been any knowledge of Alcmaeon's reputed dissection of the cerebral nerves, but he refrains from making any remark on this though he knew taste was a function of the nerve supplying the tongue and though he quotes

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[3] Kuhn, C. G., Galeni Opera Omnia, vii, 122, Lipsiae, 1821–33.

Alcmaeon's views elsewhere[4] as to the nature of both taste and smell and accredits him with the theory we have found in Plato's "Timaeus." He knew that Plato[5] regarded the brain, the heart, the liver as the seats of the three souls of man, but that is not the way he puts the idea in his commentaries on the theories of Hippocrates and Plato. He speaks of Plato regarding the liver as a beast[6] but in these commentaries he says[7] Hippocrates joined Plato in regarding the brain, heart and liver as the principal organs governing the body, a much more rational appeal to us than Plato's tripartite soul, though I suppose Plato would have thought Galen's form more or less identical with his own. I do not remember that Hippocrates speaks in this sense at all either in the full edition of Littré of the Hippocratic Corpus, or in Adams' "Genuine Works," nor do I find any reference to it in the indices.

Galen almost never contradicts Hippocrates and very seldom Plato, though he rejects vigorously the belief of these ancient Greeks, supported as they are by Aristotle, that the drink goes with the breath to the hollows of the lungs to cool the fever of the blood and regulate its temperature in the heart. Plato says the spleen is to the left of the liver, near by it to act as a sponge in keeping it clear and bright, for like a mirror the liver reflects the nobler emotions of the mind in the heart. It is prophetic and mirror gazing long remained one of the tricks of much later wizardry, and here we see it bound up with the hepatoscopy which came from Babylonia and perhaps further east. I cannot take space to follow the affiliations of the thought here with mania, melancholia and the depressive states whose origin is so often ascribed to the derangement of hepatic metabolism. I simply here draw attention to the frenzy of primitive prophets and medicine men, and to the bile, next after the blood the most important of the fluids of the humoral doctrines. In Plato it is a part of the physiology of the spleen to purge away the impurities of the liver, and we thus get a link with the idea of purgation in the mystic rites of primitive man and, mounting at once from the ridiculous to the sublime, with the Artistotelian idea of Greek tragedy purging the soul of men; but I cannot afford space here for the further exposition of the burrows of ancient thought in this direction either.

I have made only cursory mention of triangles and the plane and solid figures formed by their coalescence, which form the ultimate divisions of matter and, as we should say, their molecules. I hope to be able to show elsewhere how suggestive of Plato's geometric figures are schematic representations of molecular chemistry, with which we have become familiar, the lattices of crystals revealed by the *x*-rays; even the quantum theory of Bohr has its rather distant affinities to these ancient speculations concerning the constitution of matter. Suffice it to say here these triangles do not appear to be immortal but "are originally formed with power to live for a certain time, beyond which no man can prolong his life." The young have their triangles new, just like ships fresh from the launching ways. They are close together and pliable. The marrow of the bones contains them and is the bond of life between the body and soul. God took some of his choice triangles and mingling them properly made the marrow out of them to be the universal seed of the whole race of mankind and in this marrow or embryonic matter he placed the various kinds of souls. That which was to be the receptacle of the divine or superior or rational soul, the brain, he made round in every way. The rest remained in the marrow and about it the animal body was formed. This was the mortal part of the soul protected by bone, like the brain. This bone made by the demiurge of pure sifted earth was kneaded up and subjected to the action of water and fire. The flesh was made by mingling fire and water only. This act of creation seems to have been fashioned after that of the bakers of clay images in their kilns and seems a childish activity of the imagination.

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[4] *Op. cit.* xix, 310.

[5] *Op. cit.* x, 635.

[6] *Op. cit.* iii, 309.

[7] *Op. cit.* v, 506.

Aristotle refuses to believe all this complexity of structure of which Plato speaks can come about by the unaided action of the elements. "How can they account for the generation of flesh and bone or any other continuous body? The elements alone, because of their collocation, cannot produce a continuum, nor can the composition of planes . . . It removes generation from the world."[8] This Aristotle proposed to obviate by the interposition of his entelechy. Many a modern physiologist has followed his example. It was not Plato who introduced that mysticism. It was Aristotle. "Plato and Democritus," complains Aristotle elsewhere,[9] "ask no questons as to how flesh or bones or any of the other compound things come to be; nor again does Plato examine the conditions under which alteration or growth are attributable to things." Aristotle's mysticism, bound up in a single word, entelechy, is much easier to apply than Plato's variegated and exuberant invocation of the incomprehensible and has had a greater career in the world of science.

Whatever may be said of the physics, as it stands in the "Timaeus," the physiology of Galen presents little which is suggestive of modern physiology and much which borders on the absurd. It is curious, to see from what a groundwork the physiology and pathology of six or seven hundred years later sprang, as revealed in the works of Galen, and how much he owed to Plato. One should not wonder so much at the errors of Galenic anatomy and physiology as admire the advances made from the knowledge of them current in the days of Plato. The scalp was formed by the help of the cerebral humor, the moisture springing up from beneath the sutures and consolidating them. This skin the divine power pierced all around with fire and out of the punctures the moisture issued. Owing to this the hair sprang up in the skin. So the Creator made our heads all hairy which increased their efficiency as the safeguards of our brains, for the brain is the seat of the sublimated soul. I assume Plato had metempsychosis in mind, but there is another passage which reads as though he wished to intimate that women would scratch:

> From the combination of sinew, skin and bone, in the structure of the finger there arises a triple compound, which, when dried up, takes the form of one hard skin, partaking of all three natures and was fabricated by these second causes, but designed by the principal mind or cause with an eye to the future. For those who formed us well knew that women and other animals would some day be framed out of men and they further knew that many animals would require the use of nails for many purposes; wherefore also they stamped in men at their first creation the forms of nails.

There then shortly follows the puzzling passage which I have thought referred to the connective tissue of the body likened to a fisher's net. In a dim sort of way it seems to form a contrivance for the circulation of the body fluids and the entrance of air through the pores of the skin, but I will not repeat what I tried to make out of it several years ago.[10] Some of the wonders of movement in the body mechanism are compared to those of amber and the Heraclean Stone, from which we may infer the ancients had noted some of the phenomena of surface tension and the magnetism of the lodestone. Plato mentions these in connection with the catastrophes from lightning. Large advances have been made in our knowledge of the surface energies of animal membranes but in these passages there is evidence that his speculations were inspired by the same phenomena and took the same direction as did our own.

The thing which stands out with greater prominence for the modern reader, though that is largely due to the general diffusion of the knowledge that there was once a humoral doctrine which ruled ancient medicine, is the emphasis Plato lays on the unnatural excess and deficiency of the four natures of which the body is impacted. Again we get what seems like a veritable farrago of nonsense devoid of any possibility of useful comment. "The oldest part of the flesh, which wastes away, refusing to assimilate, grows black from long burning and from being corroded in every direction. becomes bitter and is injurious to every part of the body, which is not yet corrupted," evidently gangrene. Disease arises sometimes from wind, sometimes from phlegm, sometimes from bile. Phlegm though dangerous when detained within by reason of air-bubbles, yet being capable of expulsion on expiration, is less severe and only discolors the body, generating white leprous and similar diseases. This we fail to understand, but it is here he intimates phlegm is the cause of epilepsy when it goes to the head. It causes the Sacred Disease because that is the sacred part. It is the cause of catarrhal diseases, having separate names according as they occur in separate localities. This is the etiology given to it by Hippocrates before him and by Galen after him. It is supposed the treatise on the Sacred Disease of the Hippocratic Corpus is of an authorship later than the epoch of Hippocrates II. In the latter end of that treatise occurs the well-known protest against calling any disease divine, all being due to natural causes. Plato says it is called divine because it is located in the head, the seat of the divine soul. There is also a nuance here in the discussion of the etiology, which makes it seem very probable that the "Timaeus" was of an authorship antedating this Hippocratic book. The tirade in this book against mysticism in medicine is of the later date and probably the Hippocratic author had in mind the divinity ascribed to it in the "Timaeus," though it is very possible he was talking against primitive man's idea of a divine interference in all convulsive disorders. Plato's ascription of its name to its supposed location in the head does not rest on this conception.

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[8] De Caelo. 306*b*, 19. Oxford translation into English.

[9] De generatione et corruptione, 315*a*, 28–30. *Ibid.*

[10] Wright, J. *N. York M. J., etc.*, July 31, 1920.

Almost anywhere the reader strikes the trail of medicine in the "Timaeus" as has been said, there quickly begins the drift to metaphysics, though it is often across a bayou of the sea now called psychology: "Where the sharp and briny phlegm and the bitter and bilious humors wander over the body and find no escape, but are compressed within and mingle their own vapors with the motions of the soul and are blended with them, they produce an infinite variety of diseases in all sorts of degrees and, being carried to the three places of the soul, they create infinite varieties of trouble," much mental disorder and psychical complications arising. The soul in some individuals being more powerful than the body sometimes "convulses and disorders the whole inner nature of man; and when too eager in the pursuit of knowledge, causes wasting; or again, when teaching or disputing in private or in public, and strifes and controversies arise, inflames and dissolves the composite frame of man and introduces rheums and the nature of this is not understood by most professors of medicine who ascribe the phenomenon to the opposite of the real cause." Evidently for Plato it was the soul itself which was at fault. Melancholia was an affection classified in medicine on an etiological basis. Orthodox medicine said it was the black bile which was at fault. Plato said the soul was chiefly at fault. I think on the whole that is the opinion of modern psychiatrists.

Lastly Plato laid down a maxim which has persisted with the best traditions we have today. "We should not move the body without the soul or the soul without the body"; for the most of the time since Plato this has been repeated with approval by most experienced practitioners of medicine. Let the mathematician practice gymnastics. With exercise of the soul let there be exercise of the body; but he apparently frowns on passive exercise. That motion is best which is produced in a thign by itself, for it is most akin to the motion of the intelligent. There is exercise not alone of the muscle fibers but of the channels which bid them move, we would say to help the thought gain a more secure foothold on modern soil, "but that motion which is caused by others is not so good and worst of all is that which moves the parts of the body when prostrate and at rest, in parts only and by external means; wherefore that is the best of the purifications and adjustments of the body—by gymnastics." For torpidity of the bowels this is the best sort of treatment, though purgation "may be of use in a case of extreme necessity, but in any other contingency it will be adopted by no man of sense." A ten-mile walk is the best cathartic.

"Wherefore we ought always to manage them by regimen, as far as a man can spare the time, and not provoke a disagreeable enemy by medical treatment."

GERHARD HENRIK ARMAUER HANSEN

(1841–1912)

By I. KOBRO, M.D.

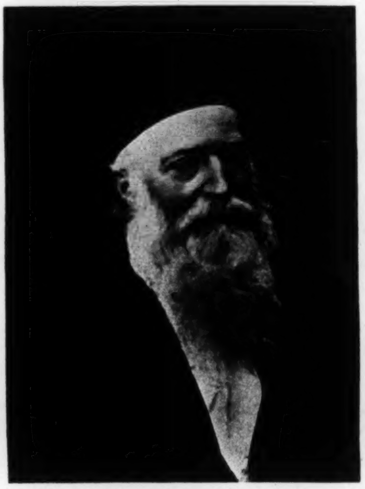
CHRISTIANIA, NORWAY

AMONG the physicians of Norway during the nineteenth century Armauer Hansen occupies a prominent position. He was born in Bergen on the twenty-ninth of July, 1841, passed through his medical examination in 1866, and lived from 1868 continually in his native town, where he worked in the hospitals for leprosy erected there. From 1875 on he had the title of "chief physician for the leprosy in Norway" (*médecin inspecteur général de la lèpre dans toute la Norvège*) and in 1901 the parliament of Norway granted him as a personal reward the highest professorial wage. Armauer Hansen died on an official journey in the little town of Florø on the twelfth of February, 1912. Death came quietly and without any warning. He was found dead in his bed in the morning after having been glad and contented the previous evening. But it did not come unexpectedly. During the last years symptoms of a vascular and heart disease had been continually more prominent.

In his young years Hansen excited attention on account of his interest in studies of nature and his great capacity for work. In 1869 he obtained the gold medal of the University of Norway for his paper: "Contributions to the normal and the pathological anatomy of the lymph-nodes." He was a keen student of zoology and was especially interested in marine fauna. He was from its very first days an eager defender of the evolution theory of Darwin, which stood in harmony with his own bright belief in the eternal progress. He was, on the whole, always a keen warrior for the importance of science to the progress of mankind, and a warm advocate of liberty, and of mental liberty above all.

GERHARD HENRIK ARMAUER HANSEN (1841–1912).

In 1868 when Hansen was appointed assistant physician at the hospital for leprosy of Bergen (*Lungegaardshospitalet*), he at once found the work which was to take all his interest, and to which he at once gave all his strength. The physician in charge of the hospital was Dr. D. C. Danielssen (1815–1894), the founder of scientific leprology. He had a peculiar faculty of animating his pupils and exercised a strong influence upon young Hansen, of whom he was very fond. They discussed very eagerly and argued, each for his standpoint. This was just at the time when Virchow's theories as to pathological processes came into the medical world, and were introduced into the University of Norway by one of the pupils of the master, Prof. E. Winge. It accordingly was very natural that Armauer Hansen should take up the study of the pathological anatomy of leprosy.


D. C. Danielssen (1815–1894).

The theories concerning the etiological causes of leprosy were at that time very various in Norway. Some considered leprosy as a non-specific hereditary disease, which might arise from bad conditions of life (D. C. Danielssen, W. Boeck, O. G. Høegh). Others thought that the disease was neither specific nor hereditary (J. L. Bidenkap, Johan Hjort). Still others considered it specific, miasmatic and not hereditary (H. Holmsen). The fourth opinion was that it was a specific disease, which was spread for the most part by heredity, more seldom by contagion (F. Lochmann). A peculiar theory was that of Th. Buchholz: that leprosy was a "disease of the people," a construction fault, a variation of the basal form, a degeneration caused by stagnation of the life of the whole nation.

The young Armauer Hansen through his studies soon came in opposition to his elders, as he held that leprosy was specific and contagious. In 1874 he contributed to the Medical Society in Christiania a "Communication considering Studies as to the Etiology of Leprosy." In this paper he deals thoroughly with the term "heredity." He refers in detail to all his investigations both in the laboratory and in the districts, where the sick and their families were examined (pedigrees stated). He attacked and tore asunder point by point everything that had been stated to the benefit of the theory of heredity, and stated his own arguments to support his view that leprosy was a contagious disease. However, he wrote somewhat reservedly as he stated that continued investigations were necessary. He says:

> That rod-like bodies are to be found in the leprous nodes is not doubtful, neither that they mostly are found within the cells; but that these rods are bacteria and the large brown elements perhaps cells, surrounding zooglea bodies, is not certain.

Here Armauer Hansen has pointed out the observation which made him a well-known man and which was the starting point for his later studies, namely his discovery of the *bacillus of leprosy*.

The idea of a living virus as the cause of disease had at that time only few supporters, and methods for the detection of bacteria were very primitive. The microscope was very simple, homogeneous immersion lenses were not yet in common use, and the staining methods of Weigert and Koch were not described till later.

There was not much attention paid at once to the discovery in the scientific world, and Hansen himself did not lay much stress upon it. But the German professor Neisser (from Breslau) came to Bergen in 1880 and had an opportunity to study Hansen's material. Hansen was then just engaged in experiments with the new staining methods, but he had not had much success. Although Neisser came directly from Weigert and Koch, he had not much more success than Hansen; he took, however, some of Hansen's preparations with him to Breslau, where he succeeded in staining them. Meanwhile Hansen himself had succeeded through advice from Koch. As Neisser claimed to have discovered the bacillus first, he published his success, and the "bacillus of Neisser" was claimed by the Germans. Hansen took Neisser's "experiment" very coolly, as he knew that he had published his investigations in the paper already mentioned. But Danielssen was furious and "scolded me for my indolence, when anybody tried to steal my discovery." A compromise name, *Hansen-Neissers bacill*, was used soon after. But then Hansen published his investigations[1] and in this paper stated the fact that he had discovered the etiology of leprosy, and the name of Hansen is now alone attached to the bacillus of leprosy. In the smooth (anesthetic) form of leprosy the bacilli were first found by C. Looft (Bergen) in 1891 in the skin lesions (erythematous spots), while Arning was the first to find them in the nerves (1884).

Later on Hansen published numerous papers on the clinical and pathological features of leprosy. But above all his name is attached to the hygienic and legislative endeavor, that has been carried on in Norway to eradicate the disease. The most important consequences of his discovery of the infectious nature of leprosy are the laws passed in 1877 and 1885. The practical results of these laws are indisputable. To the legal enforcements of isolation and disinfection and to forced admittance to hospital the diminution of the number of lepers in Norway is undoubtedly due. The following statistics show this:

Year	Lepers in Norway
1856	2833
1875	2209
1905	474
1908	394
1920	160
1923	140

Sweden in 1907 had 89, in 1923, 37; Iceland had in 1896, 237, in 1920, 67. In Japan there were 23,815 lepers in 1906 and 16,261 in 1919.

Armauer Hansen's "Norwegian system" for the fight against leprosy is now accepted and practiced by all countries that suffer from the dreadful disease.

The *first* Norwegian law, which was passed on the twenty-sixth of May, 1877, states that poor lepers must not be given into *laegd*[2] and that they as a rule must be sent to hospitals or official homes for poor. If they do not stay in the home, they must be provided for in a manner permitted by the sanitary officials in each place. Husband and wife shall not as a rule be separated, if they wish to live together. They may, however, be separated against their own will, if the sanitary officials find it necessary. Disinfection must be carried out after death. Violation of this law is punished with fines.

The *second* law dates from the sixth of June, 1885. While the law of 1877 deals only with those who are provided for by the community as poor, this law goes further and states that all lepers can be isolated from their families by the health officers, husband and wife, however, excluded. If this was not voluntarily carried out by the patient himself, it was made compulsory. Otherwise this law repeats the statements of the older law.

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[1] *Vrtljschr. f. Derm. u. Syph.*, 1882.

[2] *Laegd.* We have had in Norway a mode of providing for the poor, called *laegd*. The poor one was sent from farm to farm and stayed some weeks in each, during which the owner of the farm had to provide for him or her.

The laws concerning leprosy met with strong criticism and were attacked by the leading physicians of the time. Among the critics were Th. and J. Buchholz, J. Bidenkap, Hj. Heiberg, Lochmann, Wulfsberg. In the name of humanity they protested against "this last drop in the cup of pains of the lepers." As they did not find the contagiousness of leprosy fully demonstrated, they expected the new law only to be a law on paper. The law, however, also found its warm defenders, such as E. Kaurin, F. C. Kiaer, Chr. Lund and H. R. Smith.

As time has passed, all attacks have ceased, and the humane, careful manner in which the law has been practiced, has silenced all protests. In some cases the admission to the hospital encountered some resistance on the part of the patient, owing to old superstition; but as a rule it was easy to convince the public of the usefulness of these measures.

The Norwegian tuberculosis law (of the eighth of May, 1900) would not have been passed, had not the leprosy law shown such good results.

As an example to show Hansen's early use of experimental methods, the following may be mentioned. He put a needle through a node in a leper and then inoculated the juice which stuck to the needle into the conjunctival sclerae of another patient, suffering from the anesthetic form of leprosy, by pressing the needle through the conjunctiva. The experiment showed a negative result, and did not injure the patient, but it cost Hansen his position as physician at the leprosy hospital.

Inoculation in man had earlier been tried many times by Danielssen, who was a great experimenter. He inoculated himself and several of the servants and the patients in the hospital, in 1844, 1846, 1856, 1857, always with a negative result. In animals one has later thought to get a "local leprosy" (a local infection of the surroundings of the inoculated tissue). But P. F. Holst, E. Kaurin and others found that the positive results were very doubtful in experiments on rabbits.

Armauer Hansen inoculated rabbits and cats (1874) and made numerous cultural experiments, but all with negative results. This is not to be wondered at, as science nowadays with its modern methods has not been capable of cultivating the bacillus of leprosy.

Armauer Hansen was a peculiar person, whose appearance was most striking. He had a strong body, a sharply cut, handsome profile and a long beard, that in his later years was white and gave him somewhat of the appearance of a prophet. If one was able to approach him a little closer, one would soon find out, that he was a very interested man, a "savant," and that he was not silent. From his long journeys in Norway and in foreign countries he had many stories to relate, and they were always told with humor; a humorous point was an enjoyment to him. In his "Memoirs," which unfortunately are not so rich in content as they might have been had he written them down earlier (he was seventy years old when they were published), we find the following:

> I said once to a farmer, that if I got old enough, I might perhaps live to see, that we had no more leprosy in the country, and that would certainly be a most joyful experience. "What shall you make a living out of then," he asked. I said that perhaps my country would not let me starve. He thought this might be so, but anyhow, it would be no splendid livelihood.

Hansen had the fortune to see his scientific discoveries acknowledged, in contrast to so many scientific workers, who go unacknowledged to their graves. He received many honors. Here we will only mention that he in 1894 was made *doctor medicinae honoris causa* by the University of Copenhagen, further that he was elected an honorary member of many scientific societies, and that he was honored with Norwegian and foreign decorations. When he was sixty years old, his statue, made by the Norwegian sculptor Visdal, was unveiled. It is erected in the garden before the Museum in Bergen. The initiative to honor him in this manner came from an international committee, consisting of prominent physicians under the presidentship of Rudolf Virchow. The speaker at the unveiling was Professor Lassar, who among other things said:

> As molded in metal his individuality is enclosed in itself. With a clear view, free of every prejudice, looking out into the far-off, with his glance directed at the great whole, thus he stands there—a monumental personality. And thus we will hold him fast, hold him in his best age of manhood with all his faculties, so peculiar and marked, in the full ripening of the autumn. Not when the days of his earthen life belong to the remembrance! But now when he is ours, we will see him, *aere perennius*, now and in all future . . What characterizes him scientifically is the pathological-anatomical basis for his scientific view, the correctness of the results of his investigations, his thorough theoretical schooling and above all the penetrating knowledge, that dominates all, he publishes. To this must be added an eminent practical work, not exactly as a physician for the single patient, although cleverness and philanthropy can place him above many of us. But Hansen has, according to his task, developed into a watcher of the well-being of the people, a hygienist at large. Norway can thank him and his pupils for the evident and astonishing diminution of leprosy which until his time was steadily increasing.

The last acknowledgment which Hansen received was that his funeral was undertaken by the Norwegian state.

PAPERS PUBLISHED BY ARMAUER HANSEN

Only the most important of Hansen's papers can be mentioned here. It would have taken too much space to go through all his publications.

1869 in *Nordisk medicinskt Arkiv:* Preliminary contributions to the characteristics of leprosy (written in Norwegian). Here he throws new light upon the etiology of leprosy.

1872 in *Norsk Magazin for Laegevidenskaben:* On our knowledge about the cause of leprosy and our measures against the disease (written in Norwegian). "The disease has only one cause, it is specific and contagious."

1874, additional number of *Norsk Magazin for Laegevidenskaben:* Report to The Norwegian Medical Society in Christiania about a journey undertaken to study the etiology of leprosy with a contribution from the society (written in Norwegian). This paper has been very little known outside Norway, a fact that must be regretted, as it is very important and has had a fundamental influence upon our modern ideas about leprosy. During his pathological-anatomical studies he especially notes the "brown bodies," and in 1873 he had for the first time seen the bacilli in leprous nodes. It had been known before that time that acute diseases might be caused by bacilli, but not chronic diseases. This was ten years before Koch discovered the tubercle bacillus.

1880 in *Nordisk medicinskt Arkiv.* Bacillus leprae. Here he gives the name to the bacillus. As both Neisser and Eklund had published their examinations of preparations, where they had found bacilli which such skilled men as Cohn and Koch thought to be the virus of leprosy, Hansen now, to maintain his priority and state had to publish what he had found some years before and had not published in 1874 as he thought it somewhat doubtful.

1882 in *Nordisk medicinskt Arkiv:* Further studies of the bacillus of leprosy (written in Norwegian). In 1881 he started experiments with monkeys. The results were negative in so much as the local lesions were healed. But he wished to keep the animals living and see the development, as the incubation period in man no doubt is quite long, at least one year. It may be, however, that the monkey is refractory against leprosy, and perhaps it is man only who has the privilege of getting leprosy. He discusses here his many cultural investigations.

1882 in *Vierteljahresschrift f. Derm. u. Syph.*, x: Einige Bemerkungen über die anästetische Form des Aussatzes. xi: Die Aetiologie und Pathologie der Lepra.

1897 (together with C. Looft): Lepra. Clinically and pathologically-anatomically discussed.

1909 in *Mitteilungen der II internat-Lepra-konferenz in Bergen*, 1909 (together with H. P. Lie): Die Geschichte der Lepra in Norwegen.

1910: Memories and Contemplations (written in Norwegian).

1912 in *Lepra*, XII: Heredity of leprosy.

EXPERIMENTAL CANCER, AN HISTORICAL RETROSPECT[*]

(From the Laboratories of the Philadelphia General Hospital)

By E. B. KRUMBHAAR, M.D.

PHILADELPHIA, PA.

INTRODUCTION

THE steady increase of cancer throughout the civilized world, coincident with the diminution or disappearance of many of the other field officers of the "Men of Death," have combined to focus attention on malignant disease as very nearly the most important single plague with which mankind now has to contend. Consideration, therefore, of one of the most important ways of studying this problem should not be untimely or unprofitable.

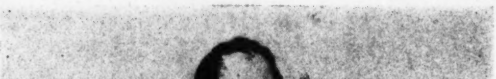

FIG. 1. Johannes Müller.

Cancer has been recognized since early antiquity; the Egyptians (Ebers Papyrus) and Hippocrates (see terms *Carcinos*, an inflammatory swelling and *Carcinoma*, a true neoplasm) were familiar with its external manifestations at least. Celsus not only recognized some of its visceral forms, but went far in differentiating it from benign neoplasms and inflammatory swellings. The ubiquitous Galen of course observed cancer with some accuracy, but hindered the progress of medical knowledge on the subject for centuries by the dominance of his doctrine of the four humors. To him cancer was due to the concentration of *atra bilis*, or black bile, and this, or similar nebulous hypotheses, sufficed as an explanation of its cause for many centuries. Following the discovery of the circulation of the blood and of lymph vessels, Malpighi, Louis, Le Dran and Astruc developed the idea that cancer was caused by coagulating and degenerating lymph; and even the astute Morgagni and John Hunter were unable to replace this view.

In this way the conception of cancer as a general disease, or as due to a special diathesis, persisted until the nineteenth century, when with the advent of the cell theory (*omnis cellula e cellula*) Johannes Müller and Virchow convinced the world that cancer consisted of an abnormal growth of abnormal cells. Again hypotheses as to the underlying cause of this abnormality became rife. This is not the place to do more than mention some of these; and at any rate the principal ones, Virchow's chronic irritation theory, Cohnheim's stimulation of misplaced embryonal nests with Ribbert's later modification, heredity and the parasitic theory are too well known to you to require further notice at the moment. These natural outgrowths of the developing study of morbid anatomy and bacteriology have contributed greatly to the nosology, morphology, histogenesis and natural history of tumors, but for some years now have not seemed capable of taking us much further in our knowledge of the etiology of malignant tumors.

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[*] Presidential Address: Philadelphia Pathological Society, Jan. 8, 1925.

The experimental method, then, in this field, as in so many others, seems to offer the most promise in elucidating this mystery which is of such enormous importance to the human race. For although occasionally the means of successfully combating a disease is accidentally found before its cause is known, more often discovery of the cause must precede discovery of a fundamental method of treatment.

In the experimental field, perhaps the earliest and today the most profitable essays have been along the line of the experimental production of tumors in animals. Begun toward the middle of the last century, it was soon found that tumors of one species would not grow in animals of a different species and that transplantation of adult tissues even into animals of the same species was soon followed by absorption (Zahn,[1] Leopold), whereas transplanted embryonal tissue might persist indefinitely and proliferate, though it lacked some of the characteristics of tumor growth (L. Loeb, Fichera). From Cohnheim's conception of embryonal rests, Askanazy educed the theorem: "Embryonal tissue separated by space as well as time may give rise to tumors," and submitted it to experimental proof by injecting intraperitoneally an emulsion of embryos of the same species. This produced in many different species the semineoplastic condition named "teratoid" (first obtained by Feré in 1897), and in three such animals Askanazy found that carcinoma later developed. He was properly cautious, however, in deciding whether this was due to a carcinomatous change in the teratoid itself, or in the tissues of the host due to the irritation of the teratoid.

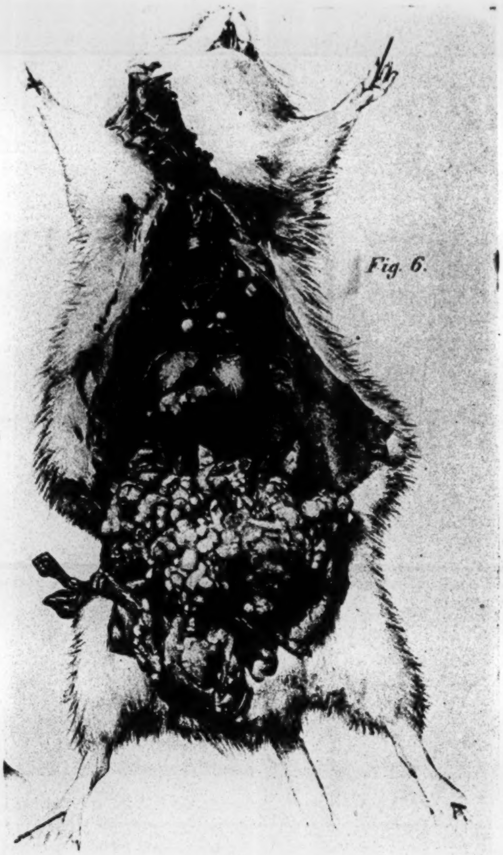

FIG. 2. A "TERATOID" TUMOR IN A RAT, PRODUCED BY INJECTING EMBRYONIC EMULSION.

Tumor material was first successfully transplanted into another animal of the same species by Hanau[2] in 1889. From a white rat several hours after its death from epithelioma of the vulva, with metastasis to both axillary and inguinal lymph-nodes, he transplanted bits of the tumor into the tunica vaginalis of two old rats. Both of these grew and another successful transplantation was made into the third generation. Hanau attributed the previous failures of other investigators to technical errors and to the injection subcutaneously rather than into lymph-spaces. Until the next century, however, the importance of this experiment, which opened a new and fertile line of research, was not recognized in spite of its confirmation and amplification by Morau,[3] von Eiselsberg,[4] Firket[5] and Velich[6] in the next decade. In 1901 Leo Loeb[7] in this country and Jensen[8] in 1903 in Denmark published work which established the inoculability of cancer as an accepted fact and thus permitted the study of the cancer problem from a new biological point of view. Loeb, having found a cystic sarcoma of the thyroid of a white rat, successfully inoculated it into other rats and carried it through forty generations in twenty months, without change in its histological structure. In numerous communications he was a pioneer in furnishing evidence on many factors, such as the effect of temperature, infection, recession of growth, spontaneous disappearance, age, race, sex of animals and so forth, which influence the growth of transplanted tumors. Jensen's studies were even more important in emphasizing the importance of this method to European investigators. He not only succeeded in transmitting a typical mouse cancer through nineteen generations over a period of two and one-half years, with thirty to sixty per cent successful takes; but reported observations on the persistence of histological structure, frequency of mitoses, absence of metastases and of microorganisms, resistance of the cancer cell to various agents, the conditions of successful transplantation and similar topics. (The account of his rat sarcoma, which is probably the most used experimental tumor in Europe today, was published several years later.)[9]

FIG. 3. RUDOLF VIRCHOW [1821–1902].

The stimulus given to cancer study by this work was quickly reflected in the formation of new societies, institutes and journals. The *Zeitschrift für Krebsforschung* was started in 1903 by the Zentralkomitee zur Erforschung und Bekämpfung der Krebskrankheit (1900); the *Reports of the Imperial Cancer Research Fund* by Bashoford in 1904 (founded 1901); the *Bulletin de L'Association Française pour l'Étude du Cancer* in 1908; *Tumori* by Fichera in 1911; *Gann, Ergebnisse der Krebsforschung in Japan;* the *Studies in Cancer* of the Crocker Research Fund by F. C. Wood in 1912; and the *Journal of Cancer Research* in 1916, the last named being the official organ of the American Association for Cancer Research. The New York Memorial Hospital for the Treatment of Cancer (reorganized 1899), the New York State Institute for the Study of Malignant Disease (1899), the Institute of Cancer Research of Columbia University (1911), the St. Louis Cancer Hospital, the Huntington Memorial Hospital in Boston and the Radiological Department of the Philadelphia General Hospital (1921) in this country and the Middlesex Hospital Cancer Research Institute (1909), the Radium Institute (1911), and the Cancer Hospital in London are indicative of the intensive manner in which the cancer problem is now being studied.

Although the successful growth of inoculated tumors in animals was as necessary and important a step in cancer research as the methods of pure culture were for the early study of bacteriology, nevertheless this method was soon found to have obvious limitations. The transplanted tumor grew, to be sure, and eventually killed the host, but was found to behave so differently from spontaneous tumors in several ways, that it was always questionable whether observations and deductions elicited by this method could fairly be translated to the problems of spontaneous cancer. Such transplanted tumors rarely metastasized and although necessarily connected with the host by considerable vascular connections, they were definitely encapsulated and, as far as I know, nervous connections with the body of the host have never been demonstrated. Nevertheless a permanent and constant source of tumor supply had for the first time become available, by which the problems of virulence and adaptation, individual and family resistance, heredity, growth of tumor cells *in vitro*, the effects of diet, metabolism, tissue chemistry, meteorological influences and countless other variants could be submitted to scientific investigation.

The second big advance in the experimental study of cancer, also constituting a new era in cancer research, was Fibiger's[10] discovery that "spontaneous" gastric carcinoma could be produced at will by feeding to rats the larvae of a nematode worm. As an example of patient and ingenious research, his method deserves detailed notice. Having observed spontaneous gastric carcinomata in three rats that had been inoculated with tubercle bacilli, he endeavored unsuccessfully to propagate the tumor by inoculation into other rats. Minute study of the tumor sections having shown a peculiar structure that looked somewhat like the cross section of a parasite, he reconstructed a model from serial sections, to find that he was dealing with a nematode, which he later dissected in the gross and named spiroptera neoplastica. Further trouble awaited him in its identification, however. More than a thousand rats were sacrificed and carefully studied without finding tumor and parasite again. At length in the literature of animal parasites, he read that Galeb had secured nematodes in rats' stomachs by feeding them the common cockroach (Periplaneta orientalis), which was the host for this worm in another stage of its life cycle. His attempt to secure the worm's development in this way failed, however.

When the sustaining hope was almost gone, he heard of a large sugar refinery in the town, where both rats and cockroaches swarmed. The cockroaches here were of a different kind; they were P. americana, uncommon in Northern Europe. An examination of the rats revealed many cases of gastric tumors, and in them the long-sought-for nematode was found. A false clue and a stroke of fortune that was bravely deserved, led him to the great discovery. These cockroaches had come in consignments of sugar from the West Indies; in their muscles were the coiled-up larvae of the nematode and when the cockroaches were eaten by the rat the larvae were set free and developed in the stomach into the adult nematode. Here, after a time, it produced eggs which were evacuated with the faeces, eaten by the cockroach, and the larval stage again produced, and so the cycle went on (Leitch).[12]

Though the success of the experiment was said to have been further endangered by the burning-down of the sugar refinery, he was able to keep the supply going, and, by feeding cockroaches with ova and then feeding rats with the bodies of the infested cockroaches, he produced, first inflammatory changes, then papillomata and finally true carcinoma. The acuteness of observation, the "prepared mind," fertility in method of attack, patience in obtaining data, courage in the face of failure, judgment in drawing conclusions, all contributed to this really great investigation—to Leitch's mind, the greatest contribution to experimental medicine of this generation. Of the experimental rats that survived for more than two months, more than half developed carcinoma, after intervals of forty-five to sixty-six days. In one case metastasis occurred in one-hundred and four days. The resulting tumors were large, papillomatous overgrowths of epithelium with considerable keratosis, which filled the stomach cavity even to occlusion. The usually invasive properties of carcinoma were present and it is significant that no ova or parasites were found in the metastases.

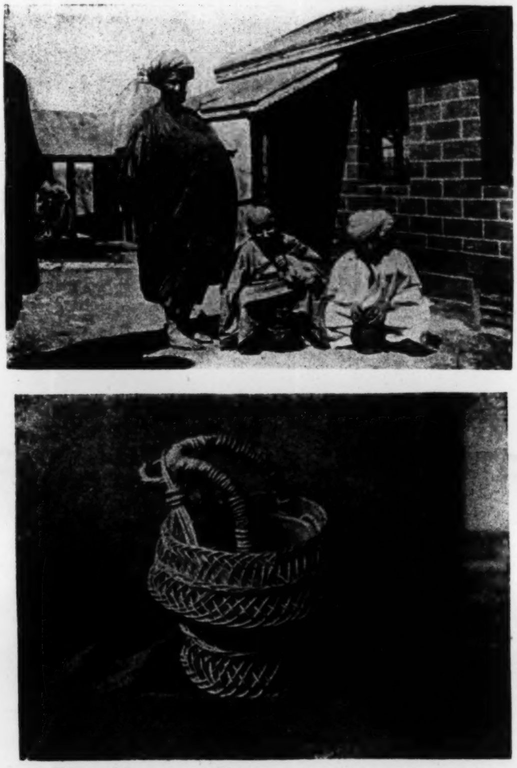

FIG. 4. NATIVES OF KASHMIR AND KANGRI BASKET.

The ability thus to produce a real cancer almost at will constituted a great advance in that it overcame many of the limitations unavoidably associated with the inoculated tumors.

As experimental material, however, the stomach cancer was not especially suitable. The discovery, therefore, by Yamagiva and Ichikawa,[11] Japanese investigators who were stimulated by Fibiger's work and by the prevalence of cancer in tar workers, that a true skin cancer could be produced by repeated painting with coal tar, also constituted an important advance. By applying the tar every other day over periods of fifty-five to three-hundred and sixty days, either on the inner or outer surfaces of rabbits' ears, they succeeded in producing horny papillomatous growths, which in seven cases progressed to true cancer and in two metastasized. Later investigators have amply confirmed the possibility of producing cancer with tar, but have shown that the mouse constitutes a more favorable subject for this experiment. The frequency and amount of dosage, the best form of tar to be used and similar details are rapidly being worked out. An interesting development of the tar-cancer work is Murray's recent observation that whereas a tar tumor can never be induced in a mouse that already bears one, if the secondary applications are started at just the right time after the primary, tumors are induced with even greater ease, i.e., a temporary period of susceptibility exists.

In similar vein, Leitch has been able to produce true carcinoma of the skin by repeated administration of arsenic and of paraffin (shale oil), and has also produced carcinoma of the gall-bladder of a guinea pig by inserting human gallstones. Bulloch and Rohdenburg's[13] rat sarcoma of the liver following ingestion of Cysticercus fasciolaris (the larva of the cat tapeworm Taenia Crassicollis) is another achievement in the same line. Such experiments, together with the well-known clinical observations of the prevalence of cancer in chimney-sweeps, workers in tar, aniline dyes and paraffin, betel-nut chewers, the Kangri basket carriers of Kashmir, smoker's cancer of the lip, Bilharzia disease, *x*-ray and radium workers and similar irritating occupations, all point strongly to Virchow's old theory that cancer is due to a chronic irritation. We can be sure that that is not the whole story, as many of those exposed to these irritants fail to develop cancer and many irritants apparently have no carcinogenic influence, just as many bacteria are not in the least pathogenic. The probability, however, remains very strong that some form of irritation is at least an essential factor in so disturbing the normal development of cells that they undergo malignant change.

When tar cancer, for instance, can be produced in a big percentage of tests at any designated spot of the body, how can it be maintained that it was due to the sudden activity of Cohnheim embryonal rests, unless these are considered to be so ubiquitous as practically to lose significance. Even then the effect of the stimulus must also be taken into account.

More careful study of spontaneous animal tumors has shown that they are much more numerous than previously supposed. In fact two American investigators have conducted long series of studies on spontaneous tumors alone. Besides various mammals, birds, fish and even lower animals have been found to be subject to tumors of various kinds.

The ability to obtain experimental cancer material in animals at will by the methods previously described has resulted in many new phases of study of the cancer problem, which cannot be discussed here. The study of the host's resistance, however, and of the growth of tissue cells *in vitro* cannot be overlooked.

Just as it takes two parties to make a bargain or a fight or an infection, so it is claimed with some reason that it takes two parties to produce and maintain a tumor: the tumor itself and the host in which it is growing. Factors that stimulate, inhibit or prevent tumor growth are sufficiently numerous to make it logical to expect that further study of these mysteries will not only throw light on the nature of tumor growth but possibly afford a clinical means of slowing or preventing it entirely. Individual tumors are known to vary greatly in their speed of growth at different times; the young are much less susceptible to cancer than the old, and experimentally it was early found that something stopped tumors of one species from growing when transplanted into another species. By the use of the transplantation method, it was next found that animals once successfully inoculated were resistant to a second inoculation (Bashford)[14] and even that a resistant state could be induced by the injection of intact living cells of normal tissues. Disintegrated or dead cells were inactive and the resistance only seemed to apply to subsequent transplants, not to spontaneous tumors or transplants already established. Radiation of tumor cells has been tried as a means of stimulating immunity to tumor growth, and Contamin[15] and Wedd, Morson and Russ[16] believed that they had secured a certain degree of immunity in this way. More recently Chambers, Scott and Russ[17] found that with an accurately measured dose of radiation (a "rad," i.e., just enough to prevent the tumor cell from surviving) upon inoculation into animals, substances are given off which not only hinder or prevent the growth of subsequent inoculations, but in their hands have materially hindered the growth even of an established tumor. In fact, they have even had encouraging results in the clinical treatment of cancer by this method, although it must be admitted that in other hands it has failed to prove of value.

The extensive and ingenious work of Murphy[18] and his associates at the Rockefeller Institute has demonstrated the importance of the host from a very different point of view. Impressed with the close relation of the lymphocytes to tumor growth and resorption, they have devised numerous experiments to elucidate the significance of this relationship.

> The chick embryo, which normally lacks the ability to destroy a heteroplastic tissue graft, if supplied with a bit of adult lymphoid tissue becomes as resistant as the adult . . . An adult animal deprived of the major portion of its lymphoid system by repeated small doses of *x*-ray, no longer has the power to destroy a graft of foreign tissue and this tissue will grow actively. The chief characteristic of a failing heteroplastic graft in the unsuitable host is a marked accumulation of lymphocytes . . .

there is also a lymphocytic crisis in the circulating blood.

If a cancer is removed by operation, and the animal subjected to small "stimulating" doses of *x*-ray, the reinoculated cancer is said not to develop on account of the lymphocytosis produced, whereas in the controls, the cancer graft though submitted to the same dose of *x*-ray outside the body, when returned to the host grows as usual. "Autografts from spontaneous cancers of mice when replanted into areas previously exposed to an erythema dose of *x*-rays, failed to grow in the majority of instances, while similar grafts inoculated into untreated areas grew in a large proportion of the animals." A dosage of *x*-ray sufficient to kill an autograft *in situ*, failed to do so on similar tissue, if rayed outside of the body, or if after being rayed *in situ*, it was transplanted elsewhere, the inference of course being that death was brought about in the first instance by the effect on the bed and not on the cancer cells themselves. These and similar experiments, too numerous to mention here, if confirmed by other investigators (and it is only fair to say that in some details they have not been), show great promise in advancing our knowledge of the body's resistance to cancer.

The method of growing pure tissue cultures *in vitro*, attempted by Leo Loeb in 1898, made practical by Ross Harrison and improved by Burrowes, Carrel and others, is showing promising developments in cancer research. Not only has it been possible to grow pure cultures of carcinoma and sarcoma cells in this way, but some of their capabilities for pernicious growth have been demonstrated. Under ordinary conditions they grow so fast that they quickly degenerate and die out, but Fischer has recently succeeded in making them grow indefinitely by adding normal chicken muscle to the culture. It seems as if the tumor cells could utilize the normal cell protoplasm, whereas normal cells under these conditions require embryonic juice as one of the necessary elements of maintenance. Another difference between tumor cells and normal cells has been found by Drew by this method. The delay required by adult tissues before starting growth under these conditions can be eliminated if an incubated kidney extract be added to it (Carrel's "Trephones"). An ice-cold kidney extract fails to accelerate growth; whereas an ice-cold tumor extract is just as efficient as the incubated kidney extract, the inference here being that malignant cells are constantly producing a growth-promoting substance which normal cells only produce when injured or autolyzed. The light that these observations throw on repair processes and a possible explanation of malignant transformation is considerable. By the tissue-culture method, also, Drew has shown that the loss of differentiation of cells, on which so much stress is laid by pathologists in tumor diagnosis, is a relatively superficial characteristic which in the case of epithelium can be removed *in vitro* by the admixture of connective tissue. By thus acquiring a base of operations, they revert to their normal form and habit of growth.

The important work of Maude Slye in the past thirteen years on hereditary factors in cancer incidence in mice must also be mentioned. By selective breeding, as is well known, she has secured in descendants of a limited, carefully selected stock, some strains that are practically completely resistant to cancer production and others that are unusually susceptible. The resistance to cancer seems to be a typical dominant character in the Mendelian sense, while susceptibility to cancer behaves as a Mendelian recessive. Although this is of course of extreme importance in comprehending the nature of cancer and applies equally well to man as a biological organism, it should perhaps be mentioned that it is of very little, if any, clinical significance, in the sense that the probability for cancerous offspring could be estimated in individual unions. In the necessarily mixed strains of human genetics, the conditions of the rat experiment will never be approximated, so that inheritance of cancer, cancer families and so forth will presumably continue to play a negligible clinical rôle.

Finally a few words about the parasitic theory of the cause of cancer, which has been maintained in one form or another since ancient times and is still not without upholders. Occasional increased local incidence of cancer in certain families, houses, streets or towns, or apparent epidemics in man or beast, have naturally given rise to speculation about its possible infectious qualities; but not only has proof of infection never been forthcoming in such cases, but they are often bristling with fallacies, and permit of other more logical explanations. The number of microorganisms which have been grown from cancer tissue and advertised as its cause is legion. Appearing from an early period in the history of bacteriology, even to the present day, none have stood the test of time, though some, such as Doyen's Micrococcus neoformans, were given considerable reclame and support. Spirochetae, blastomycetes, protozoa, mycetozoa have all been incriminated, but possible causes of error, such as technical or clinical contamination, production of tumor-like granulomata and not true neoplasms, the possibility of symbiosis or saprophytic existence and so forth, have always operated eventually to discredit any claims that have hitherto been made. Gaylord's thyroid tumor of fish is an entirely respectable example of this kind of error. Certainly our present knowledge of the natural history of cancer places a large burden of proof on anyone attempting to establish its parasitic cause. The most interesting recent experimental work on this line is Erwin Smith's elaborate investigation of the plant overgrowths caused by his Bacillus tumefaciens, easily isolated from crown gall. Even if it is accepted that he has produced true tumors, the reservation must be made that his bacillus may be acting like tar or arsenic or ova of nematodes or tapeworms, as what might be called a semi-specific irritant, i.e., an essential factor but not the cause of tumor growth, a consideration which is fortified by his ability to produce similar growths in plants by other means. Rous' filtrable chicken sarcoma and a few similar phenomena are still in the doubtful borderland. If proved to be a true neoplasm, our conceptions of tumor growths will certainly have to be modified to fit in with Rous' tumor.

I have tried to give a short survey of the various experimental methods that have proved of value in the study of the cancer problem. Not only have they intrinsic historical value, as examples of how the scientific mind has attacked a baffling complicated problem urgently set before it by the needs of the human race; but they are also practically valuable, as indicators of what to pursue and what to avoid and as possibly containing in one or other line the hidden solution of the problem of cancer.

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MAIMONIDES ON "PHYSICAL HYGIENE"

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MAIMONIDES, the renowned Jewish physician and philosopher of the twelfth century, according to available records, wrote in addition to his various religious and educational works a number of treatises pertaining to medical topics. The range of subjects covered by him was exceedingly broad. Undoubtedly the most famous and best known of all is the "Treatise on Personal Hygiene,"[1] prepared for Alfadhel, the ailing son of Saladin, to whom he acted as personal physician. Almost equally as popular is his "Book on Poisons," written at the request of the Vizier Kahdi-el-Fadil.

Other of his titles include:[2] "Aphorisms From Various Medical Writers"; "Commentaries on Hippocrates"; "Compendium of Galen's Works"; "Translation of Avicenna"; "Etiology of Disease"; "Sanitary Regulations"; "Consultation on Various Accidents"; "Ethics"; and numerous writings on such topics as "Food"; "Medicaments"; "Hemorrhoids"; "Sexual Relations"; "Gout"; "Asthma"; "Physiology"; "Stomach" and "Brains." In addition there is his epic "Oath and Prayer for Physicians," which might well be placed along the side of the famous Hippocratic oath.[3]

It was through a desire to gain access to some of these writings that a small book entitled: "The Principles of Physical and Moral Health of Man," was obtained by courtesy of the Librarian of the Library of the Surgeon General of Washington, D.C. This work, consisting of forty-eight pages translated into French by M. Carcousse, and published in Algiers in 1887, is an extract of an abridgement of the Talmud which Maimonides prepared under the title: "The Second Law."

As epitomized in the introduction, the pages of the book "are full of truths, useful lessons, healthful advice, and gentle philosophy, embracing at the same time what man owes to himself physically and morally and what he owes to others." The greater part of the book deals with moral precepts, offering a detailed study of character and conduct. It is in Chapter IV that valuable rules of "Physical Hygiene" are laid down and they are herewith submitted as translated:[4]

Section I. Since a healthy and strong body is a thing agreeable to God, and since it is impossible to understand God when one is sick, it is indispensable to avoid the things which impair the body and to direct oneself toward the practice of things which fortify it. They are as follows:

One should never eat except when he is hungry, nor drink except when he is thirsty, nor delay any of his excretions for even one moment.

Section II. One should excrete every time that he feels the need.

One should not keep eating until his stomach is distended, but should decrease his food to the proportion of one-quarter of his capacity.

During meals one should drink only a little water, or water mixed with wine.

When the food begins to be digested in the stomach one can then drink whatever he feels is needed; however he should not drink very much even then, even though he believes that doing so would be necessary to facilitate digestion.

One should not eat until after he has observed carefully whether he needs to satisfy his natural requirements.

One should eat only after having walked or undergone some form of exercise, and thus provided heat for the body.

In summing up, one should exercise and fatigue the body every day in the morning until he is warm; he should then rest a little to cool himself off, and then eat his meal.

If he washes himself with warm water (that is, takes a bath), after thus exercising himself, he will be acting wisely; he should then rest a while and then sit down to the table.

Section III. After the meal one should remain seated, or else lie down on the left side a while; he should not walk, or ride horseback, or fatigue or agitate his body in any way until the food has been digested. He who goes walking or tires himself out soon after eating exposes himself to serious illness.

Section IV. The day consists of twenty-four hours, one-third of which is sufficient for sleeping, that is to say, eight hours, preferably at night, so that from the beginning of the sleep to the rising of the sun eight hours will have elapsed. In this way one will have left the bed at dawn.

Section V. One should not lie on the stomach or on the back, but on the side; in the beginning of the night on the left side, towards the end on the right side. One should not lie down immediately after the meal but should wait three or four hours.

It is bad to sleep during the day.

Section VI. One should eat those things which physic the body, such as raisins, figs, berries, peas, melons, cucumbers, and fruits of the same species before the meals and not mix them with other foods. It is best to wait a little while until they have gone from the superior stomach (the stomach proper); then one can eat the ordinary foods.

As for those things which bind and constipate, such as pomegranate, quinces, apples, etc., they should be eaten immediately after the meal, but with extreme moderation.

Section VII. If one should eat the flesh of birds at the same time as that of other animals, one should begin with the former of these meats.

If one is to eat the meat of small and large cattle it is advisable to begin with the former.

One should always begin with that which is light and finish with that which is heavy.

Section VIII. In the summer it is best to eat cold foods, not to use too much seasoning, and to make use of acid things.

In winter one should eat warm foods, with plenty of seasoning, including a little of mustard and asafetida.

These same rules should be followed in warm and cold climates because in each place it is necessary to do that which is best suited.

Section IX. Certain foods are deadly; one should not use them: old salted large fish, old salted cheese, truffles, champignons, old salted meat, wine just from the press, and food which has been kept until it has acquired a bad odor.

Foods which smell bad or taste bitter are poison for the body. One should eat very little of such, and then only at long intervals; one should be careful not to have them constantly for his meals, or to mix them with other foods for all his meals. Some of these are large fish, cheese, and milk that has stood for twenty-four hours.

The flesh of large oxen and of large goats, beans, lentils, chick peas, barley bread, leek, unleavened bread, cabbage, garlic, onions, mustard, black olives, all constitute bad food. One should eat very little of them in the winter, and never any of them in the summer; and as for the beans and the lentils, they should be eaten neither in the winter nor the summer.

Pumpkins should be eaten in the summer.

Section x. Other foods which are also bad, but to a lesser degree than the preceding ones are birds of the water, small pigeons, dates, dough which has been fried or kneaded with oil, farina which has been treated to the point of removing all traces of bran, brine, and sauces made with salted fish. It is best not to use these substances too often.

That wise man who knows how to control himself, who does not yield to his desires, and who refrains from eating these foods (unless he is forced to do so for the sake of his health and by the order of the doctor) is bound to be a strong man.

Section xi. One should abstain from the fruits of the trees, eating very little of them except when they are dry. It is unnecessary to add that they must not be eaten before they are ripe. When they are completely ripe they are very nourishing to the body. There are also some which are always unhealthy, such as locust beans and acid fruits. One should eat very little of them, and then only in the summer, and in warm climates.

Figs, raisins, and almonds are always good whether they are fresh or dry; one can take as much of them as one desires, but one must not eat them constantly. They are much better than the other fruits of the trees.

Section xii. Honey and wine are bad for children, but are healthy for old people, especially in the winter.

One should eat in the summer two-thirds of what he eats in the winter.

Section xiii. One should conduct himself so that his stomach is always relaxed, or at least it should be kept free to function properly. It is a fundamental principle of medical practice that if one is constipated or has great difficulty in moving the bowels, a dangerous sickness is imminent.

If one is constipated, how can intestinal evacuation be facilitated? If one is young, some herbs cooked in water and seasoned with olive oil, a sauce of salted fish, some salt, and no bread should be taken. Or one can take some strawberry leaves or cabbage with olive oil, and the sauce of salted fish, with salt.

If one is an adult he should start the morning with honey diluted with water, and then wait four hours before taking the customary meal. He should repeat this for the next three or four days until his stomach becomes normal again.

Section xiv. Another great principle of bodily health is that when a man keeps occupied and tires himself out, and then relaxes, and keeps his bowels open, he is never sick. His strength remains unimpaired even though he uses unhealthy food.

Section xv. He who is always at leisure, and who does not keep busy, who does not excrete at the proper time, whose stomach is bound up, even though he does eat healthy food and conduct himself according to the rules of hygiene will always be weak and suffering.

Excess in eating is detrimental and the origin of many maladies. Many of the indispositions with which man is afflicted come from bad food, or superabundant consumption of food even though it is good and healthy. Solomon has said: "He who heeds his stomach and his tongue avoids many misfortunes."

Section xvi. One should take a bath every seven days, but never immediately after eating, or when one is hungry; it is best to wait until the food has been digested.

The body should be washed with warm water, but not boiling water. The head should be washed with water warm enough to burn the skin. The body should be washed first with warm water, then with water less and less warm, until cold water is attained.

Neither merely warm nor cold water should be used on the head.

Cold water should not be used on the body in the winter.

One should bathe only after having stimulated perspiration, and after having rubbed the body.

One should not remain long in the bath. Immediately after sudation and friction one should wash oneself and then go out of the bath.

Before entering the bath as well as after leaving it, one should observe whether he needs to proceed with the natural excretions. This should also be observed before and after meals, before and after copulation, before and after every exercise, before and after sleep, and in general under all circumstances.

Section xvii. On leaving the bath one should put on his clothes and cover his head even if he is inside, in order not to be cold. Even in the summer one should take these precautions.

After coming out of the bath one should wait a few minutes until the respiration is calmed, until the body is rested, and until the excess of heat has disappeared before eating.

It is an excellent thing to sleep a little on leaving the bath before eating.

One should not drink cold water on leaving the bath or even while in the bath. But if one can not resist thirst on leaving the bath, he should drink water mixed with wine and honey.

In winter it is advisable to rub oneself with oil after the bath.

Section xviii. One should not form the habit of bleeding oneself often, unless absolutely necessary. One should not do it in any case, either in the winter or in the summer, but a little in the first month of spring and the first month of autumn.

After the age of fifty bleeding should no longer be practiced.

One should never take a bath on the day of this operation, nor should one undergo it on arriving from a journey.

On the day of bleeding one should eat a little less than ordinary and obtain sufficient rest, not tiring oneself out nor giving oneself over to any work or movement.

Section xix. Copulation is the strength of the body; it is life; it is a light to the eyes. But when one abuses it the body is consumed in its vigor and life is crushed. Solomon has well said in his wisdom: "Give not your strength to women."

He who plunges himself into the abuse of women is assailed by decrepitness; his strength is lost; his eyes are weakened; and a bad odor exhales from his mouth and stomach. His eyebrows, his eyelashes, his hair, all fall out, but the hair of his beard, arm pits, and legs multiply on the contrary. The teeth loosen and fall out. In addition other grave conditions are imminent. Doctors have said: "One man in a thousand dies of an ordinary sickness; a thousand from the misuse of women." Therefore one should take precaution on this subject if one wishes to live without suffering.

One should not have sexual intercourse except when one believes himself to be healthy and very strong.

When erection occurs in a natural and unconscious manner, and when after directing one's thoughts towards other subjects one feels the erection persist, and if there is a sluggish sensation in the regions of the kidneys, and the cords of the testicles are tightened and the flesh is warm, then one needs to have sexual intercourse and it is hygienic to perform the act.

One should not have sexual intercourse either when the stomach is full or when the stomach is empty. It is always well to wait until digestion has commenced.

Before as well as after sexual intercourse one should observe whether there is a need of urinating or moving the bowels.

One should never have intercourse standing or seated, or in the bath, or on the day when one has bathed, or the day of bleeding, or on setting out or returning from a journey.

Section xx. To him who conducts himself according to all the preceding rules we guarantee that he will never be sick until he becomes old, and that he will die without needing a doctor. He will enjoy a healthy body and all the vigor of his resources, unless he has a body badly constituted from birth, or unless he has been accustomed to bad things since he came into the world, or unless he has been stricken by a disease or a famine.

Section xxi. The rational rules which we have presented should be followed only by a healthy man; the invalid, the sick one who has contracted bad habits for a long time, must follow the special rules which will be given in our work "On Medicine."

Section xxii. The changing of clothes is the beginning of a sickness.

In localities where there are no doctors the healthy man and the sick man should not depart from the precepts which we have placed in this chapter. The consequence will be good for them.

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SAMUEL THOMSON (1769–1843)

AND HIS PATENTED "SYSTEM" OF MEDICINE

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THE nineteenth, which was known as the "wonderful century," was not free from medical delusions. It would seem, regardless of our boasted progress, that the human mind at the present day is as easily imposed upon in medical and surgical matters as it was in the darkest period of medievalism. Probably this, or a somewhat similar, thought came to the mind of Adam Smith, later the author of "The Wealth of Nations," when on September 20, 1774, he sent to Dr. William Cullen of Edinburgh that famous letter advocating "Free Competition in Medicine." However, the celebrated political economist appears to have had some doubts concerning its reception, for he closes his letter with these words: "Adieu! my dear doctor; I am afraid that I shall get *my lug*[1] [ear] *in my luse* [hand], as we say, for what I have written."

FIG. 1. PORTRAIT OF SAMUEL THOMSON. FROM THE "NEW GUIDE TO HEALTH," BOSTON, 1835.

The philosopher is inclined to look upon such outbreaks with equanimity, for he knows that every such movement, however ridiculous it may appear to be, contains some elements of good and ultimately redounds to the benefit of the human race.

In this paper I purpose describing one of those illegitimate sons of Aesculapius, who have arisen from time to time to vex the souls of the regular profession. Samuel Thomson was a remarkable man. He was a positive character. Lauded to the skies by thousands of the laity, he was condemned to perdition by the majority of the medical profession. A son of the soil, in youth almost as ignorant as the untutored savages who roamed the forests in proximity to his father's farm, this man succeeded in acquiring a certain amount of medical knowledge, gained the confidence of the public, and founded a system of medicine which has had a powerful and far-reaching influence.

Environment has much to do with character. "Had John Hunter," said Dr. Benjamin Waterhouse, for twenty-seven years professor of theory and practice of medicine in Harvard Medical School, "had John Hunter, whom I well knew, been born and bred where Samuel Thomson was, he would have been just such another man; and had Samuel Thomson been thrown into the same society and associations as John Hunter, he would, in my opinion, have been his equal, with probably a wider range of thought; but both are men of talent and originality of thought."[2]

Samuel Thomson was born in Alstead, New Hampshire, February 9, 1769, of very poor parents. That country was then a wilderness; there were no roads and marked trees served to guide the traveler. Thomson says in his narrative:

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[1] Brown, J. Horae Subsecivae. Locke and Sydenham, with Other Occasional Papers. Edinb., 1858, p. 471.

[2] Wilder, A. History of Medicine. New Sharon, Me., 1901, p. 455.

> When I was between three and four years old my father took me out with him to work. The first business I was set to was to drive the cows to pasture and watch the geese, with other small chores, which occupation kept me all day in the fields. I was very curious to know the names of all the herbs which I saw growing, and what they were good for; and, to satisfy my curiosity, was constantly making inquiries of the persons I happened to be with, for that purpose. All the information I thus obtained, or by my own observation, I carefully laid up in my memory, and never forgot.
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> Sometime in the summer, after I was four years old, being out in the field in search of the cows, I discovered a plant which had a singular branch and pods, that I had never before seen, and I had curiosity to pick some of the pods and chew them; the taste and operation produced was so remarkable that I never forgot it. I afterwards used to induce other boys to chew it, merely by way of sport, to see them vomit. I tried this herb in this way for nearly twenty years, without knowing anything of its medical virtues. This plant is what I have called the Emetic Herb, and is the most important article I make use of in my practice. It is very common in most parts of this country, and may be prepared and used in almost any manner. It is a certain counter poison, having never been known to fail to counteract the effects of the most deathly poison, even when taken in large quantities for self-destruction. There is no danger to be apprehended from its use, as it is perfectly harmless in its operation, even when a large quantity has been taken; it operates as an emetic, cleanses the stomach from all improper aliment, promotes an internal heat, which is immediately felt at the extremities, and produces perspiration. The exclusive right of using this plant for medical purposes is secured to me by patent, and my right to the discovery has never been disputed; though the doctors have done everything they could to destroy the credit of it, by false statements, representing it to be a deadly poison, and at the same time they knew to the contrary, for they have made use of it themselves for several years, and have tried to defraud me of the discovery. I feel perfectly convinced from near forty years' experience of its medical properties, that the discovery is of incalculable importance, and if properly understood by the people, will be more useful in curing the diseases incident to this climate than the drugs and medicines sold by all the apothecaries in the country.[3]

It is unnecessary to give the details of the life of Samuel Thomson. This subject has been well covered by Thomson himself whose "Narrative of His Life and Medical Discoveries" appeared first in 1822. This, according to John Uri Lloyd,[4] was many times reprinted, but no account was kept of the number.

While yet a mere lad Thomson was able to cure diseases which had defied the skill of the local physicians. He continued to gather information from old women and herb doctors and occasionally experimented upon healthy persons. Gradually he became known as a doctor and from his success he believed himself inspired. His lack of education did not weigh heavily upon him. "I finally concluded to make use of that gift which I thought nature, or the God of nature, had implanted in me." After determining to make a business of medical practice Thomson found it necessary to formulate a system. "I took nature as my guide, and experience as my instructor; and after seriously considering every part of my subject, I came to certain conclusions concerning disease, and the whole animal economy, which more than forty years' experience has perfectly satisfied me is the only correct theory." This theory briefly is: all animal bodies are composed of four elements, earth, air, fire and water.

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[3] Thomson's New Guide to Health; or Botanic Family Physician. Containing a Complete System of Practice, upon a Plan Entirely New; With a Description of the Vegetables Made Use of, and Directions for Preparing and Administering Them to Cure Disease. To which is prefixed a Narrative of the Life and Medical Discoveries of the Author. By Samuel Thomson. Duodecimo, pp. 228, 168. Boston, J. Q. Adams, 1835.

[4] Lloyd. Bulletin of the Lloyd Library, Cincinnati. Bull. No. 11, 1909, Reproduction Series, No. 7.

> Earth and water constitute the solids, and air and fire, or heat, are the cause of life and motion. That cold, or lessening the power of heat, is the cause of all disease; that to restore heat to its natural state, was the only way by which health could be produced; and that, after restoring the natural heat, by clearing the system of all obstructions and causing a natural perspiration, the stomach would digest the food taken into it, by which means the whole body is nourished and invigorated, and heat or nature is enabled to hold its supremacy; that the constitutions of all mankind being essentially the same, and differing only in the different temperament of the same materials of which they are composed; it appeared clearly to my mind, that all diseases proceeded from one general cause, and might be cured by one general remedy; that a state of perfect health arises from a due balance or temperature of the four elements; but if this is by any means destroyed, the body is more or less disordered. And when this is the case, there is always an actual diminution or absence of the element of fire, or heat; and in proportion to this diminution or absence, the body is affected by its opposite, which is cold. And I have found that all disorders which the human family are afflicted with, however various the symptoms, and different the names by which they are called, arise directly from obstructed perspiration, which is always caused by cold, or want of heat; for if there is a natural heat, it is impossible, but that there must be a natural perspiration.

Thomson further held that since metals and minerals are heavy and are obtained from the earth, their tendency is to draw those who use them downward toward the earth; whereas, vegetables growing upward, their tendency is to develop and benefit those who use them.

The therapeutics of Thomson is delightfully simple. "The first and most important consideration was to find a medicine which would establish a natural internal heat, so as to give nature its proper command." For this purpose he used *Lobelia inflata* which had been described botanically by Linnaeus, but the discovery of whose medicinal virtues is claimed by our author. "To hold the heat in the stomach until the system can be cleared of obstructions" the best agent is Thomson's "No. 2," or capsicum. "My next grand object was to get something that would clear the stomach and bowels from canker" and "my preparation called No. 3 is the best for that purpose." This may be any one of several articles: bayberry, white pond lily, hemlock, marsh rosemary, sumach, witch-hazel, red raspberry, or squaw weed. Thomson says:

> My general plan of treatment has been in all cases of disease, to cleanse the stomach by giving No. 1, and produce as great an internal heat as I could, by giving No. 2, and when necessary, make use of steaming, in which I have always found great benefit, especially in fevers; after this I gave No. 3, to clear off the canker; and in all cases where the patients had not previously become so far reduced as to have nothing to build upon, I have been successful in restoring them to health.

SOME OF THOMSON'S TROUBLES

Thomson's career was a variegated one, and always he was in trouble. Always, with few exceptions, he was at war with the physicians whose territory he invaded; and on many occasions he quarreled with his friends and partners. Often he was the victim of cruel and unjust persecution and prosecution. By the machinations of a "regular" physician he was indicted for murder, in 1809, and was triumphantly acquitted, the chief witness against him being soon thereafter convicted of grave robbery.

Much of Thomson's time was wasted in controversy. He quarreled with almost every man with whom he had business transactions. He died a disappointed man.

The "New Guide to Health," which was first issued in 1822, passed through many editions, some of them exceedingly large, but with few changes other than supplements. Figure 2 is the title page of the 1835, one-volume edition, in small type set solid. It comprises both the "Narrative," 228 pages and the "Guide to Health," the latter consisting of a description of diseases and their treatment, 168 pages.

Why and How Thomson Obtained His First Patent

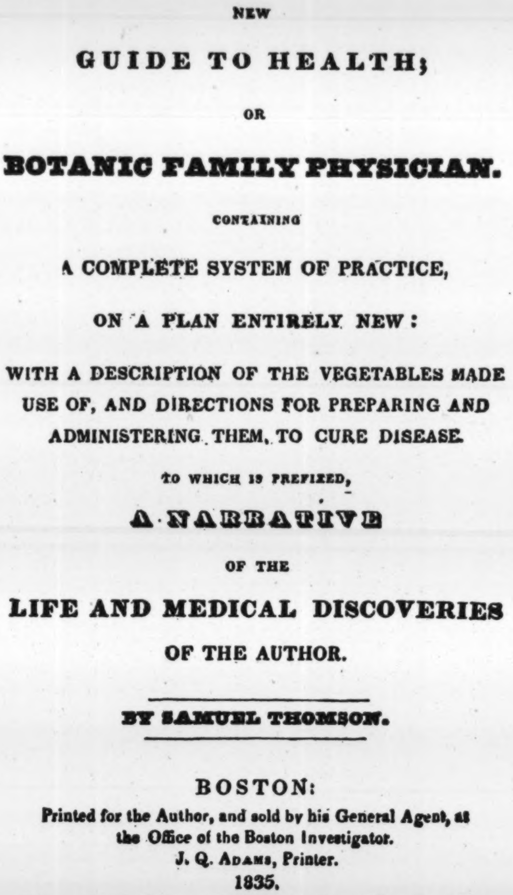
In 1813, after the usual unnecessary delays incident to the transaction of business in Washington, Thomson obtained a patent on his "system." He wrote a book which was sold together with the right to practice the "system" in a limited territory.

Thomson informs us that, wearied by persecution and after "mature reflection," he decided to try to extricate himself from the dangers which threatened him on every hand. He says:

> I finally came to the conclusion that there was only one plan for me to pursue with any chance of success; and that was to go on to Washington, and obtain a patent for my discoveries; and put myself and medicine under the protection of the laws of my country, which would not only secure to me the exclusive right to my system and medicine, but would put me above the reach of the laws of any state.

Thomson started from Portsmouth on the seventh of February, 1813, and arrived at Washington on the twenty-third. The next day after his arrival he waited on Capt. Nicholas Gilman, of Exeter, and asked his advice.

> He said that he thought it could not be made explicit enough to combine the system and practice, without being too long; he however advised me to carry my petition to the patent office; which was then under the control of Mr. Monroe, Secretary of State. I went to the patent office, and found that Dr. Thornton was the Clerk, and presented him my petition. He asked me many questions, and then said I must call again; I called again the next day, and he said the petition was not right; that I must specify the medicine, and what disorder it must be used in; he said that those medicines in general terms to cure everything, was quackery; that I must particularly designate the medicine, and state how it must be used, and in what disease. I then waited on Martin Chittenden, late governor of Vermont, who was at Washington, and asked his assistance; he was from the same town where my father lived, and readily consented. We made out the specifications in as correct a manner as we could, and the next day I carried them to the patent office, and gave them to Dr. Thornton; he complained much about its being too short a system, and put me off once more. I applied again and asked him for my patent; but he said I had not got the botanic names for the articles, and referred me to Dr. Mitchell, of New York, who was in the House of Representatives. I applied to him, and requested him to give the botanic names to the articles mentioned in my petition. He wrote them, and I carried them to Dr. Thornton; but he was unable to read some of the names, one in particular; he said I must go again to Dr. Mitchell, and get him to give it in some other words, and not tell him that he could not



NEW

GUIDE TO HEALTH;

OR

BOTANIC FAMILY PHYSICIAN.

CONTAINING

A COMPLETE SYSTEM OF PRACTICE,

ON A PLAN ENTIRELY NEW:

WITH A DESCRIPTION OF THE VEGETABLES MADE
USE OF, AND DIRECTIONS FOR PREPARING AND
ADMINISTERING THEM, TO CURE DISEASE.

TO WHICH IS PREFIXED,

A NARRATIVE

OF THE

LIFE AND MEDICAL DISCOVERIES

OF THE AUTHOR.

BY SAMUEL THOMSON.

BOSTON:
Printed for the Author, and sold by his General Agent, at
the Office of the Boston Investigator.
J. Q. Adams, Printer.
1835.

Fig. 2. Title Page of Thomson's Book, Boston, 1835.

> read it. I went, and the doctor wrote the same words again, and then wrote, "or Snap-dragon," which I carried to Dr. Thornton, and requested him to put in the patent my names, and record it for himself, snap-dragon, or any other name he chose. He then talked about sending me to Philadelphia, to Dr. Barton, to get his names.

By this time Thomson was becoming tired of the shunting process. He realized that Dr. Thornton, if possible, intended to defeat his getting a patent: "I intimated that I should go with my complaint to Mr. Monroe, upon which he seemed a little more disposed to grant my request and said he would do without Dr. Barton's names." More fault was found with Thomson's petition, but he was not to be denied, and he wrote: "After all this trouble, I at length succeeded in obtaining my patent according to my request, which was completed and delivered to me on the third day of March, 1813."[5]

THOMSON VISITS DRS. RUSH AND BARTON

The next day Thomson witnessed the second inauguration of James Madison as President of the United States. He continues:

> After the ceremonies were over I went to the stage office and found that the seats were all engaged for a fortnight; and was obliged to stay till the 13th before I could get a passage. I then took passage in the stage and came on to Philadelphia, where I remained several days for the purpose of seeing Drs. Rush and Barton, to confer with them upon the subject of introducing my system of practice to the world.

Thomson was received with characteristic Philadelphia politeness:

> I spent considerable time with Dr. Barton; but Dr. Rush was so much engaged, that I was unable to have but little conversation more than stating my business. He treated me with much politeness; and said that whatever Dr. Barton agreed to, he would give his consent, so that my business was chiefly with the latter gentleman. I asked him many questions concerning my system and patent, and requested his advice of the best mode of introducing it. He advised me to make friends of some celebrated doctors, and let them try the medicine and give the public such recommendation of it as they should deem correct.

Thomson left some of his medicine with Dr. Barton, with directions how to use it:

> But before I received any return from him, he died; and Dr. Rush also died some time previous, by which means I was deprived of the influence of these two men, which I was confident would otherwise have been exerted in my favor.

Thomson gives a lucid account of the medical practice of that day, particularly concerning the treatment of yellow fever:

> I examined into their mode of treating the yellow fever; and found to my astonishment that the treatment prescribed by Dr. Rush was to bleed twice a day for ten days. It appeared to me very extraordinary to bleed twenty times to cure the most fatal disease ever known; and am confident that the same manner of treatment would kill one half of those in health. This absurd practice being followed by the more ignorant class of the faculty, merely because it has been recommended in some particular cases by a great man, has, I have not the least doubt, destroyed more lives than has ever been killed by powder and ball in this country in the same time. Those I met on the streets, who had escaped the fatal effect of the bleeding, mercury, and other poisons, carried death in their countenance; and on conversing with them, they said they had never been well since they had the fever; that they took so much mercury and opium, they were afraid they were in a decline.

THOMSON INTRODUCES HIS "SYSTEM"

After remaining a fortnight in Philadelphia, Thomson went to New York by stage and there engaged passage in a coaster. He reached Portsmouth on April 5, 1813, and at once took steps to introduce his "system":

> I gave public notice in the newspapers, of my having obtained a patent, and forbid all persons trespassing upon it under the penalty of the law, in such cases provided; and prepared and published a handbill, in which I gave a descrip-

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[5] Thomson, S. *Op. cit.*, p. 124.

tion of the nature of disease on the constitution of man; and also the conditions of disposing of the right of using my system of practice.

Thomson's handbill soon grew into a small volume which was given to the purchaser of the right to use the "system." These books were sold all over New England and in what was then the West, and the Thomsonian practice became a popular fad. The most ignorant people became physicians and practiced on the lines laid down by the New England farmer.

Like Vesalius, Bidloo, and many other men of great talents, the humble farmer was the victim of literary pirates. Soon after the introduction of the "system," he wrote:

> I received information from Portland, that the doctors had obtained one of my books of direction, which was published expressly for the information of those who purchased the right of using my system of practice, and had some knowledge of it by verbal and other instruction, had printed an edition of it, and advertised them for sale at 37½ cents a copy. They stated in their advertisements, that, "this invaluable work, which had heretofore been selling for twenty dollars, may now be had for thirty-seven and a half cents."

In many other places—Eastport, Charlestown, South Reading, and so forth "where societies had been formed, or rights sold to individuals, to give information to the people," Thomson found his book selling for 37½ cents per copy. In 1815 he printed another edition and secured the copyright, but this was pirated at Taunton.

THOMSON'S SECOND PATENT

In his fiftieth year, after having suffered many hardships and disappointments, Thomson, disconsolate at men's ingratitude, decided to appoint a "suitable agent" to care for his business; and he chose a Mr. Elias Smith for this purpose. In the winter of 1819, Thomson arranged with Smith for the publication of a new edition of the book of directions with this result: "On my return to Boston in March, he had got it done; but in a manner very unsatisfactory to me, for he had left out twelve pages of the most useful part of the remarks and directions."

Thomson and Smith soon separated. Thomson entered suit for infringement of his patent. The learned "judge decided that the specifications in my patent were improperly made out." Thomson's second patent was granted January 23, 1823. It embraced not only his medicines but included "the use of steam to produce perspiration," which, he says, "I claim as my own invention." He took every precaution to have the specifications according to law, "but whether my second patent will be more successful than the first, time must determine." And time determined that the second patent *was not* fool-proof.

THE END-RESULTS OF THOMSONIANISM

Thomson traveled extensively. "Since my last edition was printed in Boston, I have been six times in and through the State of Ohio." That these books met with an extensive sale is evident. "The practice has spread rapidly in the southern and western States," wrote the author, in 1831, "which has so much alarmed the doctors that they have succeeded in getting laws passed, in almost all the States, to prevent the spread of my practice." Thomson says these laws only tended to make his system spread the faster, "like whipping fire among the leaves."

He predicts that "the dernier resort of the doctors will be to get my practice into their own hands, and under their own management, if possible. Finding that I should succeed in my Botanic practice, certain individuals of them have set up what they call a reformed college, in New York, where they have adopted my practice as far as they could obtain a knowledge of it from those who had bought the right of me and would forfeit their word and honor to give them instruction. And finding that the Botanic practice gained very fast at the West, they have established a branch of their reformed college in Worthington, Ohio."

Thomson held his followers well in hand until about 1830. Many then rejected his claims to a monopoly, broke away from him, modified or added to his practice, and called themselves followers of the botanic or botanico-medical system, and later the reform medical system. They established colleges and journals and produced considerable textbook literature. While similar to Thomsonianism, the new system was conducted in an ethical manner and the claims of proprietorship were denied. The greatest strength of the movement was in Ohio, Massachusetts, New York, Pennsylvania and Georgia. Their earliest colleges were the Botanico-Medical College of Ohio (Cincinnati), chartered in 1838, and the Southern Botanico-Medical College (Forsyth, Georgia), organized in 1839. The former became extinct in 1880; the latter was removed to Macon in 1846, and in 1854 became the Reform Medical College of Georgia. The name was changed again twenty years later to the College of American Medicine and Surgery, of Atlanta, Ga. In 1884 it was merged into the Georgia College of Eclectic Medicine and Surgery. The Botanic colleges found a resting place for the most part in Eclecticism; some, however, entered the fold of Physio-medicalism.

FIG. 3. DR. A. I. COFFIN.

Botanic medicine was introduced into England about 1845 by Dr. A. I. Coffin, of Manchester. His "Botanic Guide to Health" passed through numerous editions and the system found much favor among laymen. His followers were named Coffinites.

Thus the Botanic, Eclectic and Physio-Medical sects with which this country abounds can be traced to Thomson. What was the reason for his success? This question can best be answered by turning for a moment to the medical practice of the time. Everywhere doctors were bleeding or salivating their patients. The use of mercury, the lancet, the denial of water to fever patients, were a part of accepted treatment by the regular profession. Even in yellow fever the victims were bled not once, but repeatedly. Regardless of the great discoveries in anatomy and surgery the practice of medicine remained in a frightfully low condition until long after the beginning of the nineteenth century. Although the Thomsonians vomited, purged and steamed their patients, often no doubt with fatal effect, yet their practice proved to physicians how erroneous their own methods had been. The adherents of Thomsonianism also did good by directing the attention of the regular profession to the efficacy of many indigenous medicinal plants. That several medical sects should have arisen as a result of Thomsonianism is to be regretted; but there is satisfaction in the thought that many of their colleges have done good work and have compared favorably with many of the so-called regular medical schools, whose diplomas, as every unprejudiced member of our profession knows, only too often have been conferred upon the undeserving.

The term Eclectic is said to have been used first in this country by the great botanist, Constantine Rafinesque, who in 1817 held the chair of botany in Transylvania University. In his *Medical Flora*, published in Philadelphia in 1828–30, he describes the doctors of the United States in terms which are not very flattering. He divides them into Rationals, Theorists and Empirics. "The Rational medical men are liberal and modest, learned and well informed, neither intolerant nor deceitful, and ready to learn or impart information. They comprise the Improvers, Eclectics and Experimentalists." He speaks of the Theorists as proud and deceitful: "They follow a peculiar theory, and mode of practice, with little direction, employing but few vegetable remedies, and enlisting under the banner of a teacher or sect. They are divided into many sects, always at war among themselves and with their rivals, such as the Brunoists, Galenists, Mesmerians, Skeptics, Chemicalists, Calomelists, Entomists, etc."

The Eclectics of the United States date the origin of their school from 1827 when Dr. Wooster Beach, of New York, founded an infirmary from which grew the Reformed Medical College. The school at Worthington, Ohio, organized in 1832 was removed to Cincinnati and chartered in 1845 under the name Eclectic Medical Institute. It has an excellent reputation for doing good work.

The principles on which Eclecticism is based were gradually developed. Beach and his contemporaries vigorously assailed the sanguinary methods of treatment used by the regular school. They condemned the use of such drugs as mercury, arsenic and antimony and advocated the use of "safe and mild remedies," especially those of vegetable origin. They favored the use of native plants and hence became known as practitioners of the "American system." They developed the manufacture of concentrated preparations of drugs. They opposed therapeutic nihilism. They professed a broad and liberal spirit, individual liberty of opinion and the obligation to employ the best agents in the cure of disease. The doctrine of specifics, developed within the last fifty years, is an article of Eclectic faith.

WHAT DID SAMUEL THOMSON DISCOVER?

Probably nothing, that was not previously known. Thomson imagined that he had made valuable discoveries and he was able to secure two patents from the United States. He appears to have deceived not only himself but also some men of high standing in the regular medical profession. Here is what Benjamin Waterhouse, professor of the theory and practice of medicine, Harvard University, wrote on December 8, 1835, "To Samuel Thomson, Botanic Practitioner of Medicine":

> I remain firm in the opinion that you were the discoverer of the remarkable virtues of the Lobelia inflata, as a safe emetic, and other rare qualities in effectually deterging the stomach and intestines of foul and morbid matter. . . . That you yourself were the originator of this compound process, very extensively known under the title of the Thomsonian Practice or System, I have no doubt whatever. I mean the uniting of the warm bath, with the thorough cleansing of the whole alimentary canal. I value and recommend it on this account. It effects in three or four days, what we regular physicians use to occupy as many weeks to accomplish.

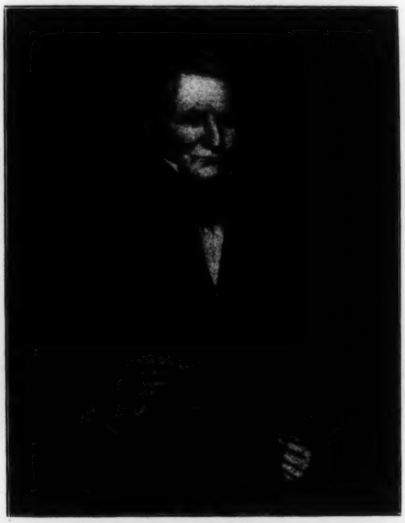
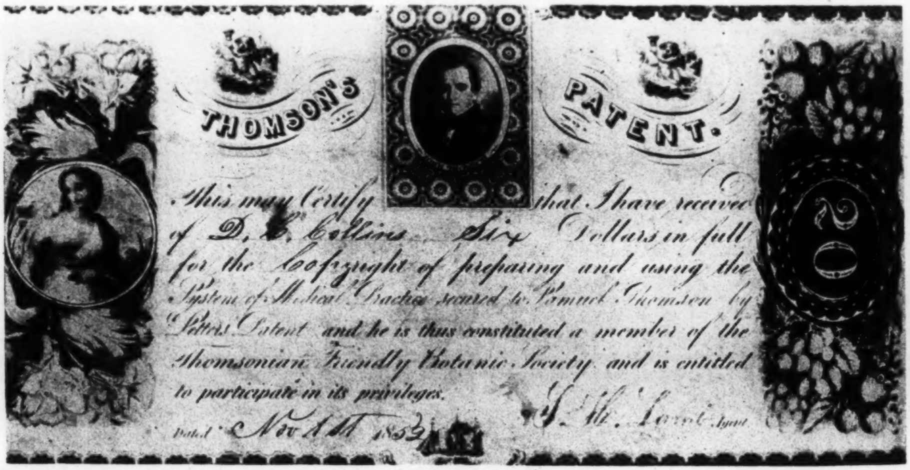


FIG. 4. SAMUEL THOMSON, AGED SEVENTY. FROM "THE THOMSONIAN MATERIA MEDICA," 1841.

Dr. Morris Mattson, physician to the Reformed Boston Dispensary, in the preface of his scholarly "American Vegetable Practice,"[6] Boston, 1841, appears to have properly evaluated Samuel Thomson:

> His actual discoveries seem to have been extremely limited. For example, the vapor bath has been employed by Europeans for several centuries; and cayenne pepper is one of the oldest remedies in the materia medica. The lobelia inflata, also, was used by the people of New England before he was born . . . I have ascertained that the medical practice of the Marshpee Indians, the remnant of whom are now to be found at Martha's Vineyard, Massachusetts, is closely analogous to that of Dr. Thomson.


THOMSON'S PATENT.
20

This may Certify that I have received of D. [illegible] Collins Six Dollars in full for the Copyright of preparing and using the System of Medical Practice secured to Samuel Thomson by Letters Patent and he is thus constituted a member of the Thomsonian Friendly Botanic Society and is entitled to participate in its privileges.

Dated Nov [illegible] 185[illegible]

J. M. [illegible] Agent

FIG. 5. FACSIMILE OF THE CELEBRATED "THOMSON'S PATENT." THE ORIGINAL IS IN THE AUTHOR'S COLLECTION. THE PORTRAIT IS THAT OF DR. JOHN THOMSON, SON OF SAMUEL THOMSON. IT WAS JOHN WHO, IN 1841, ISSUED THE UNABRIDGED THIRTEENTH EDITION OF THOMSON'S "MATERIA MEDICA OR BOTANIC FAMILY PHYSICIAN." THIS EDITION WAS DEDICATED TO BENJAMIN WATERHOUSE, M.D., PROFESSOR OF THE THEORY AND PRACTICE OF MEDICINE, HARVARD UNIVERSITY.

DEATH OF SAMUEL THOMSON

Samuel Thomson died as he had lived, fanatically devoted to his cause; an advocate of the Thomsonian Course of Medication in all that the term implies; and he passed from life heroically partaking of lobelia, enemas and the recognized Thomsonian syrups, teas, and so forth (Lloyd). On September 22, 1843, he ordered a full "course of medicine," although he must have known full well that his earthly end was near. He died on the morning of October 4, 1843.

AN OBITUARY NOTICE

The veneration in which Thomson was held by his followers may be judged from a fiery obituary notice, from the pen of Dr. A. Curtis, professor of neurology, diagnosis and medical jurisprudence in the Botanico-Medical College of Ohio:[7]

> The *Boston Courier* of the 5th inst. announces the death on the 4th, of "Dr. Samuel Thomson, originator of the Thomsonian System of medicine, aged 74 years and 8 months."
>
> And is that all, *Mr. Courier*, that you can say of one of the greatest benefactors of your race that ever lived? Could you not so much as report that he had "done some service to the state?" Yes, you have written his eulogy, whether you intended it or not, in words that speak far more in his favor than was ever said of Alexander, of Caesar, of Buonaparte, or even of Washington! Yes, Mr. Editor, he was the originator of the Thomsonian system of Medicine, "glory enough for one man,"—a system that, in forty years, and during his own lifetime, has saved more millions of human beings from

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[6] Mattson, M. The American Vegetable Practice, or a New and Improved Guide to Health. Boston, 1841, 2 vol. Volume 1 contains the first colored plates of medicinal plants issued in the United States. "They have been procured at great expense; and were executed by a new process, invented by Mr. Sharp, recently of London." Preface, p. xi.

[7] Curtis, A. *Botanico-Medical Recorder*, Oct. 14, 1843.

a miserable life and a premature grave, than the whole United States contained in the days of Washington—a system which spread more rapidly than any other system ever did upon its own merits, and which now commands the admiration and adoption of all the *wise* and good who have opportunity to inspect its claims—a system which will immortalize its founder, when the conquerors of the world shall be looked upon only as the scourges of mankind.

PUBLICATIONS OF THE THOMSONIANS AND REFORMERS

Alexander Wilder, whose "History of Medicine" gives an extended account of the new schools of medicine in the nineteenth century, and especially a history of the American eclectic practice of medicine, has wisely observed: "The immortality of a cause is assured by the vitality of its principles, the fidelity of its supporters and the quality of its literature."[8]

A vast flood of literature was produced by the Thomsonians and by kindred sects. Much of the output was controversial in character; some of it was abusive and nearly all was ephemeral. The literature emanating from the Reformers included many medical periodicals, pamphlets, broadsides and an astonishing number of textbooks. Perhaps the most valuable of these works are those which are devoted to Botany and Materia Medica. An almost complete collection of the writings of the Reformers in Medicine has been assembled by John Uri Lloyd, of Cincinnati, and is housed in the Lloyd Library.

The books written by Rafinesque, Wooster Beach, and Morris Mattson were of such worth as to reflect credit on their authors and honor on the country.

SELECTIONS FROM GIBSON'S "RAMBLES IN EUROPE"

By FRANCIS R. PACKARD, M.D.

PHILADELPHIA, PA.

NO better or more vivid descriptions of the famous members of the medical profession who flourished in France and England in the first half of the nineteenth century have been preserved for us than those contained in Dr. Gibson's account of his trip to Europe in the year 1839. From him we have received most of our impressions of their appearance, methods of practice, and professional standing. The book is long out of print and quite scarce. It seems worthwhile to print some of the most interesting of its pages, especially because some of the statements contained in them have been much garbled in the course of frequent repetitions and are worthy of preservation in their original form.

William Gibson was born in Baltimore, March 14, 1788. He attended St. John's College in Annapolis and Princeton College, and subsequently took a medical course at the University of Pennsylvania but did not graduate. Instead he went to Edinburgh where he received the degree of M.D. in 1809. While abroad he and some friends chartered a vessel and sailed to Spain where the Peninsular War was being fought. They saw the battle of Coruma. In 1815 he was again in Europe and was a spectator of the battle of Waterloo, receiving a slight wound on this occasion from a stray bullet. He was probably the only American to be present at both of these famous battles. In 1811 he was active in establishing the medical department of the University of Maryland, in which he was professor of surgery until 1819, when he succeeded Physick in that chair at the University of Pennsylvania; occupying it until his retirement in 1855. Gibson was a fine teacher, and a bold and dexterous operator. In 1812 he tied the common iliac artery for aneurysm. In addition to his professional accomplishments he was a scholar, and possessed considerable artistic ability. He died on March 2, 1868.

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[8] Wilder, A. *Op. cit.*, p. 762.

The following extracts are taken from "Rambles in Europe in 1839 with Sketches of Prominent Surgeons, Physicians, Medical Schools, Hospitals, Literary Personages, Scenery, etc., by William Gibson, M.D." The book was published by Lea and Blanchard in 1841.

SIR ASTLEY COOPER

It was natural I should wish to see the Wellington of British surgery, as Sir Astley Cooper has been emphatically styled. I had attended his lectures, occasionally, and witnessed his operations, in Guy's and St. Thomas's hospitals, thirty years before; I was familiar with his writings and high reputation at home, abroad, and indeed, throughout the civilized world, and felt no ordinary desire to form the acquaintance of one who, in addition to the highest professional renown, was allowed, by common consent, to be among the most finished gentlemen of the day; I repaired therefore, to his house, without any introduction whatever, was ushered into his presence, and received with a courtesy and urbanity I was totally unprepared to expect; for, upon my name being announced, by an attendant, he came forward with ease and alacrity, and expressed, in the kindest possible way, his pleasure at meeting one connected with a university he had long known by reputation, and with some of whose professors he had been upon the most intimate terms of friendship, whilst fellow-pupils with them, under the celebrated Hunter. Imagine a tall, elegantly formed man, moderately robust, with a remarkably pleasing and striking countenance, red, and fresh as a rose, apparently about fifty-eight or sixty years of age, but, in reality, above seventy, very agile and graceful in all his movements, simply, but handsomely attired, with a spirit and vivacity, and bearing of a youth, with, in short, no marks of advanced age, except a head as white as the driven snow, and a very just conception may be formed of the appearance of Sir Astley Cooper.

I had scarcely been seated five minutes before I found myself deeply engaged in discussing all the knotty points of surgery, question following question, in rapid succession, and the greatest interest evinced in the various answers returned—all touching points of practice, either peculiar to America, or in conformity with English or French doctrines, or notions, or, as sometimes happened, adverse to both. Thus employed, an hour glided quickly away, when a servant entered and whispered, audibly, that the rooms were full of patients, all anxious to obtain his advice. He rose suddenly, apologized for leaving me, and said "Come and breakfast with me to-morrow precisely at nine, and any morning, if you please, at the same hour, as long as you remain in London, and I will go through with you, day after day, the various preparations in my museum, the most valuable and choice of which are contained in my house." The next morning I was at my post by the appointed time, breakfast was served precisely to the minute, and half an hour afterwards I found myself in his museum listening to a lecture on the structure and functions of the thymus gland, illustrated by some of the most beautiful preparations I ever beheld. At half past ten I took leave, and Sir Astley said at parting "Come to me if you can, tomorrow at two o'clock, and I will take you to Guy's Hospital, show you the establishment and its large and splendid collection of preparations—many of which occurred in my own practice, and are very interesting and unique in their character." Whilst riding, upon that occasion, for miles along the crowded streets of London, and moving so slowly as scarcely to reach our destination for an hour and a half, I was forcibly struck with the fund of anecdote which he was constantly pouring forth, chiefly illustrative of the scenes of his long and eventful life, and relating, in many instances, to ludicrous, or remarkable, circumstances in the history of some of his professional brethren, all told in such a way, as to convince me that he possessed an innate love for fun, or mischief, so refined, however, by benevolence, as never to wound or tarnish, the characters of those whose peculiarities, or infirmities he portrayed. I was the more persuaded of this ingredient in his composition, afterwards, from hearing, through an old friend of his in the neighbourhood of Yarmouth, where he was born, the following anecdote—upon the truth of which I thought I could rely. "Sir Astley," said he, "was the son of a clergyman of Yarmouth, where, upon an occasion, the church bells began to ring, so vehemently, as to alarm the inhabitants, who ran in great numbers to the parsonage to inquire of the minister the cause of such terrific peals from the steeple. 'Oh!' said the reverend gentleman, 'I have no doubt it's all the work of that mischievous wag of mine—Master Astley—and his hopeful playmate, Tom Goodfellow.' Accordingly, upon ascending the steeple, it was found, as predicted, that the boys were busily at work, full swing, pulling and hauling the rope in fine style, and amazingly delighted at the stir and sensation they were creating throughout the town, and the trouble they were giving to the honest citizens."

During the ride Sir Astley mentioned to me, also, a striking peculiarity—which showed the power and extent of his memory—by remarking he could take up any of the poets, and from two or three readings repeat for years afterward whole passages without the slightest omission or mistake, and in proof of it, immediately recited several pages from Young's Night Thoughts. In conversing with him concerning the destruction of Hunter's papers, by Sir Everard Home, he remarked it was true, and an act of great folly on Sir Everard's part, inasmuch as it led to the belief he had never produced an original work, but had stolen every thing from Hunter; whereas, he had strong reason to believe, Sir Everard had only burnt papers which he conceived to be of little or no importance, and that he was not, justly, chargeable in a single instance, with plagiarism. He also spoke of Home, as having been an excellent surgeon, full of information, devoted to his profession but rough in his manners and operations, and so decided in character, and independent in views, as to give, upon many occasions, great offence to his patients and brethren.

Upon reaching Guy's Hospital, I had soon proof of the activity of Sir Astley's frame, and the vigour of his constitution; for he walked with the quickness of a young man, and was so rapid in his movements, as to render it difficult to keep pace with him. I was particularly struck with his demeanor towards the house surgeons, the pupils, the patients, the superannuated nurses, and every living thing about the establishment, his manner being as kind and conciliatory as possible, taking, in several instances, the old men and women aside, and inquiring into their wants, and upon one occasion, going considerably out of his way, and up a long flight of stairs, expressly to shake hands with an old woman, who had been one of his principal nurses more than forty years, and the only surviving individual, he said, who had been connected with the hospital as long as himself.

After showing several interesting cases in the wards—one, an amputation at the shoulder-joint, performed by Mr. Key, and in a fair way to recovery, the stump being nearly healed, and beautifully formed—he led the way to the surgical cabinet, and pointed out, with his own hand, each interesting specimen, giving its history and peculiarity, and waiting, patiently until I had secured his remarks in my note-book. There, and afterwards at St. Thomas's I had the opportunity of examining all the preparations referred to in his great work on Hernia, the specimens in which the aorta, the iliacs, the subclavian and carotid arteries had been tied by himself, and the causes of failure, or success, amply demonstrated. There, also, I saw a specimen in which the subclavian had been tied successfully, by Mr. Key, in a case where the axillary artery had been torn, in an attempt to restore a long-standing dislocation of the shoulder, and the result of which proved that I myself had been justified in pursuing the same course, under similar circumstances, long before. From the museum (the extent and beauty of which can only be appreciated by those who have examined it closely, as I had frequently, afterwards, opportunity of doing, and of comparing each specimen with the printed catalogue, in shape of a large volume, prepared by the intelligent Dr. Hodgkin), Sir Astley kindly took me to the College of Surgeons, where we listened to a most eloquent discourse on the comparative anatomy of the kidney, in various animals, by the celebrated Mr. Owen; afterwards introduced me to all the prominent surgeons and physicians present, and concluded by ushering me into the great Hunterian Museum, giving me free and unlimited access to every department of it, and there leaving me to revel in the regions of anatomical, surgical and scientific research, to my heart's content. From that period I became a constant visitor at Sir Astley's, and, through him, formed the acquaintance of Sir Benjamin Brodie, and most of the other distinguished surgeons of London.

There are many, even in London, who believe Sir Astley to have retired from the profession, into the walks of private life. This is a great mistake; for although he has ceased, for some years, to perform the duties of a lecturer, and to attend at Guy's Hospital, except as a consulting surgeon, he is still engaged in business and the examination of numerous cases at his own house. It is true he purchased, some years ago, a splendid seat near London, and intended to retire from the profession. For a time he was delighted with his agricultural occupations, but, alas, found himself so pursued into his retreat by his old patients, or so watched and called upon, whenever he ventured to show himself in town, that he was obliged, in spite of himself, to resume his former pursuits, and has ever since attended, regularly, to his profession. Another circumstance is said to have contributed to drive him from the country. As long, said my informant, as Sir Astley could find a case of disease in his horses, cows, sheep or pigs, he was delighted and attended them with all the interest and fidelity he would have shown to a human being, often trepanned the head of some favorite ram, or ewe, in search of the cause of its disease, but the moment he found his stock in perfect condition, he at once became unhappy and sighed for his town-house and the wards of Guy's Hospital.

SIR BENJAMIN BRODIE

Next to Sir Astley the most prominent London surgeon, perhaps, is Sir Benjamin Brodie, with whose writings and reputation I had long been familiar, but with whom, personally, I had no acquaintance during my first visit to Europe. I intended to treat him without ceremony, by calling and making myself known, but Sir Astley had anticipated me, by previously speaking in my favour, and afterwards presenting me with a letter to him. His appearance was altogether different from what I had supposed; for instead of being full, stout, and ruddy, as most Englishmen are, I found him thin, pale, and, seemingly, delicate and dyspeptic; the result, however as it struck me, of hard professional work, mental as well as corporeal, rather than of natural feebleness of constitution. His countenance was pensive, and verging towards a melancholy cast, but the moment he spoke it was lighted up by a smile, so peculiarly winning and attractive, so strikingly benignant and intelligent, as (added to uncommon softness and sweetness of voice, with manners so gentle, unpretending, and free from assurance or arrogance) to be calculated, I thought, to captivate irresistibly, the most fastidious. He inquired, eagerly, after our eminent men, most of whom he appeared to know, perfectly, by reputation; said he had been the intimate friend of our late Professor Dorsey, had corresponded with him for years, and formed the highest opinion of his talents and attainments.

After sitting some time and conversing freely on all topics, he invited me to accompany him to St. George's Hospital, where he may be said to have received his practical education, and of which great Hunterian school he has long been one of the principal surgeons and lecturers. Upon approaching the Hospital, a large and splendid edifice at Hyde Park corner, I was surprised to find it present so different an aspect from the old building with which I was so familiar in former days, and could not conceive how it had been metamorphosed, until informed by Sir Benjamin that the original Hospital had been entirely demolished, and this new and splendid fabric reared in its place.

In walking its rounds, containing upwards of four hundred beds, I saw many diseased joints, and could not avoid asking Sir Benjamin if he performed as many amputations, for the relief of such diseases, as formerly. To which he replied "Oh no—not the twentieth part." How then do you manage? By rest, position, splints and diet, was the answer. I told him I was delighted to hear so candid an avowal, inasmuch as I had long been in the habit in my lectures, of condemning the numerous operations recommended in his work, and of substituting the simple and efficient remedies he had just mentioned, for a knowledge of which the profession was chiefly indebted to my countryman, the late Dr. Physick. "Then (said he) you have not seen the last edition of my book. I will send it to you, and with it, that there may be no mistake, in future, an explanatory letter." This letter, full of just views and independent sentiments, I cannot refrain from introducing into this place.

14 Saville Row, May 22nd, 1839

My dear Sir,

I beg your acceptance of a copy of the last edition of my Treatise on the Diseases of the Joints. I also send you some pamphlets which you may, perhaps, find leisure to peruse on your voyage. I hope that my work on the joints has, at all events, contributed to diminish the number of amputations performed in this country on account of this class of diseases. Certain it is, that many diseased joints were amputated, in the earlier part of my professional life, which the London surgeons would not even dream of amputating at the present time; and that in several of the cases recorded in my treatise as having been the subject of amputation formerly (and to which, by the way I am indebted for many of my pathological observations) a cure would now have been obtained by easier means and without the mutilation of the patients.

Altogether, the proportion of severe operations has of late years become very much diminished in the hospitals of our metropolis; and I attribute this, mainly, to the improvements that have taken place in our art. Without underrating the importance and value of operative surgery, on many occasions, I must say, I could never bring myself to regard it as constituting the glory and pride of our profession. The mutilation of the human body is, at best, but a sorry expedient; severe operations are always attended with more or less of hazard; and I conceive that it is a much greater triumph for science, when she teaches us to cure by other means, than when she leads us to the same result by the most skilful and masterly operation.

I am, dear sir, with great respect, your faithful friend and servant,

B. C. Brodie.

After going through the whole hospital, prescribing for numerous patients, performing, in the wards, several simple operations, and explaining to the pupils the nature and peculiarity of each case, in a very lucid and unaffected way, Sir Benjamin took me to the museum, consisting of a small, but very choice collection of pathological specimens, beautifully prepared, and put up in better style than any similar collection I had yet seen in Europe.

Sir Benjamin Brodie may still be considered a young man, being only fifty-five, and in a climate where people attain a great longevity and preserve their good looks, even in extreme old age, is likely to remain, for years to come, at the head of his profession, surrounded by crowds of patients and looked up to as one of the brightest ornaments of British surgery.

MR. WILLIAM LAWRENCE

What medical man from this, or any other country, would visit London without seeing Mr. William Lawrence—so well known, for the extent and variety of his information, for his intimate acquaintance with, and facility of speaking, most of the languages of modern physiology, zoology, and natural history of man, for his beautifully written anatomical and surgical articles in Rees' Cyclopedia and for his excellent character in private life?

Few, I will venture to say, that have formed his acquaintance but will bear testimony to his merits. I had not inquired about his personal appearance, and was, therefore, particularly struck, upon entering his study, with his fine, manly figure; his open, expressive, intelligent countenance; his large and well-proportioned head; his lofty and expanded forehead; his clear and brilliant complexion; his mild, but sparkling, grey eye: and then when he spoke in a tone so quiet, modest and unassuming, with a manner so gentle and conciliatory, and expressed himself so kindly and affectionately towards our country—its institutions and citizens—I could not but feel I stood in the presence of a superior being, could almost imagine I had known him all my life, and warmed towards him insensibly, as if he had been an old, longtried, and intimate friend. And, yet, at that very moment, he was heavily pressed by the hand of affliction, having, as he told me, lately lost a promising son, to whom he was uncommonly attached. The next day I saw him again, having met by appointment, and followed him, amidst a crowd of admiring pupils, through large and numerous wards of St. Bartholomew's Hospital, where, in former days, I had spent many weary, but instructive hours, in listening to the discourses, and witnessing the operations of the celebrated Abernethy and his colleagues. Since that period there have been many additions to the good old building, many new wards, and others fitted up and accommodated to the taste and fashion of modern times.

Mr. Lawrence made but few clinical remarks, in passing through the wards, but questioned each patient closely respecting his symptoms, and prescribed very carefully and evidently took a deep interest in the fate of every sufferer. There were several fractured thighs, all treated by the inclined plane; numerous syphilitic affections, for which mercury, chiefly in form of blue pill, was administered; and several longstanding cases of cancerous mamma, one of eleven years' duration, for which no operations had been attempted, but only the most gentle palliatives employed—Mr. Lawrence remarking, "he had long known there were many cases of this description, which, if let alone, would not prove fatal for a great while, but if extirpated, would return speedily and subject the patients to immense suffering and distress."

Mr. Samuel Cooper

Mr. Samuel Cooper had long been known in this country, in Europe, and, indeed, throughout the world, as a literary, scientific and practical surgeon, of the first eminence. Very early in life he cultivated, successfully, foreign languages, and was enabled, through the knowledge of these, to lay up stores of information, from which most of his brethern were cut off; and having such advantages, joined to peculiar taste, for minute surgical investigation, began by publishing the opinions and practice of eminent men of every country, with comments and illustrations of his own, so peculiarly just and appropriate, with remarks and criticisms, so fair, open and liberal, as to gain the confidence and respect of the whole profession, and secure for himself a reputation for probity, industry, talent, discrimination, learning and practical skill, and for such endearing qualities of the heart and gentleman-like manners, as few men, in any country or in any age, have ever attained. His great work, the "Dictionary of Practical Surgery," and his "First Lines," the fruits of his unrivalled industry, well known to every nation on earth, where surgery is cultivated and esteemed, would alone be sufficient to establish for him an enviable fame. But he is, also, well known by his valuable labours as professor of surgery in the University of London, by his practical skill as one of the surgeons to the London Hospital, and by great experience, acquired in military hospitals, and on the field of battle, during some of the most eventful periods of the Peninsular War. It was my good fortune to form the acquaintance, and enjoy the society of this gentleman, and to glean from him many valuable facts and observations, I could have obtained from few other sources. He is now about sixty years of age; rather below the middle stature; stout, muscular, and of fine constitution, very mild and prepossessing in manners, and his physiognomy so peculiarly agreeable and benignant as to attract the notice of the most careless observer. He is still a laborious student, and unceasingly employed in enlarging and improving the works from which he has reaped so abundant a harvest of renown.

Mr. Bransby Cooper

Mr. Bransby Cooper, the nephew of Sir Astley, holds a most respectable rank in London, as a lecturer on anatomy, as surgeon to Guy's Hospital, and, as a practitioner, largely engaged in business. He is, comparatively, a young man, but has already published a valuable work on anatomy, and a volume on the ligaments, which have added much to his reputation. From having had the opportunity of knowing him intimately, and of enjoying much of his society, I am enabled to speak confidently of his open and generous disposition, his frank and manly deportment and independence of character, combined with intelligence and substantial professional acquirement, rarely met with in the same individual. Like many other English surgeons he spent the early part of his life in the army, and acquired considerable experience in the continental campaigns and in Canada, during the last American war.

Robert Liston

Mr. Liston, a native and for years a resident of Edinburgh, and a near relative of Sir Robert Liston, formerly ambassador to this country. For weeks I had resided in London, visited all the great hospitals, had become more or less intimate with most of the great surgeons and physicians, and yet felt no curiosity to see Liston, because I had been told, not by his fellow-practioners, but by apparently disinterested persons, that he was full of eccentricity, very rough and uncouth in his manners, and a perfect ursa major, upon whose humor there could be no dependence; that, at best, he was a mere operator or carver, without judgment or discretion, and his knowledge of the treatment of disease, except by the knife, extremely limited. I left London, therefore, without seeing him. Returning, however, some weeks afterwards, it suddenly occurred to me whilst passing his door, that it was wrong to be governed in any case by such prejudice. Under the influence of this feeling I pulled the bell, and at the next moment stood before him. He had been deeply engaged in examining the structure of an interesting pathological specimen, with a very splendid and powerful microscope, but rose as I entered, with an ease and gracefulness I had been unprepared to expect. Judge of my surprise, then, when I found a tall robust, and elegantly-formed man approaching me in whose handsome and regular features and penetrating eye, there was displayed a degree of intelligence, benevolence, modesty, and playfulness combined, I had seldom before met with; which joined to a manner peculiarly winning, unassuming and courteous, served at once to assure me that all the idle and gossiping tales I had so readily listened to were mere creations of the fancy. It seemed to me as if he could read my thoughts, and was pleasing himself with my agreeable disappointment; for immediately after making myself known, he said, "Come, sit down; you are the very man I want to see. I know all about you and your countrymen, and I hope you will not find me as bad a fellow as I have been represented." He then called my attention to his microscope, and the endless tortuosity of vessels displayed in the morbid structure under observation, and next took me into an adjoining room, a sort of sanctum where I saw all sorts of recent preparations, some in process of maceration, some undergoing the bleaching operation, and others dried and ready for the case. In another room, the walls of which were covered with shelves, he pulled out numerous drawers filled with instruments and said, "Here is my 'clipper'"—meaning his cutting-pliers—"there is my 'bull-dog,'" putting into my hand at the same moment the prettiest and most efficient artery-forceps I ever beheld, and so in succession showed me his entire collection, and then said: "Now, if you have time, jump into my carriage at the door, and ride to the North London Hospital, and I will show you my wards and patients." Accordingly we entered the magnificent coach drawn by a pair of spanking bays, such as I had not seen in the queen's stables, and in a short time I found myself cheek by jowl with my new friend up to his elbows in hospital work, surrounded by a flock of students, just from a lecture at the London University, in the opposite square. I saw numerous injured limbs and ulcers all elevated upon inclined planes; ah, said I, these are old acquaintances of mine—you've heard, I perceive, of Physick and his planes. "Yes," he replied, "I told you I knew all about you." Then turning quickly round to one of his dressers, who had covered a wound with charpie spread with cerate, he said, "My dear fellow, what possible benefit can you promise yourself from that greasy, slouchy plaster. Pray, if you love me, take it away,"—intending to remind the pupil of his practice of using *aqueous* instead of *unctuous* applications. During the visit he performed several minor operations with an ease and dexterity I have seldom before witnessed, and in several cases of disease, not requiring the knife, displayed uncommon skill and judgment, and proved himself equally versed in diagnosis. In a private room we found a respectable lady, her husband and daughter, who, not meeting him at home, followed to the hospital to obtain his opinion respecting a cancerous mamma, and expressed strong desire to have it removed. He examined the breast very closely, and also the glands of the axilla, and finding the latter enlarged, immediately said, "My dear Madam, do not suffer any one to touch you with the knife; let it alone and you may yet live for many years." The lady and her friends implored him to remove it, but he remained inflexible, and said, "If I cut it out it will return in three months, and you will die; if I let you alone you may live for a long time." It was just such a case as many a surgeon in Europe, and in this country, would have attacked by the knife without ceremony, and it gave me a better opinion of Liston's judgment and abilities than I should have formed, under other circumstances. I remarked to him, "My views correspond exactly with your own, but I am surprised at your giving such advice, inasmuch as you have the credit of never losing an opportunity to use the knife." He turned to his friend, Dr. Anthony Todd Thompson, and said, "Do you hear that?" and repeated my words.

Though, seemingly, of robust frame and great strength of constitution, he is so solicitous of preserving his health, and is so confident of the value of active exercise on horseback, as for a long time to have kept hunters and a pack of hounds, which while he lived at Edinburgh, he exercised at day break, and long before most of his brethren were out of bed. It is said he has now abandoned the sport, having fractured his pelvis, and nearly broken his neck at some inordinate leap, and since that period has followed the exercise of a boatman on the Thames, by rowing every morning several miles before breakfast. He has a passion for domestic animals—horses, dogs, and cats. His enormous black cat, Tom, is almost as well known in London as Liston himself, being, not unfrequently, mounted alongside his master in the splendid chariot, and a constant guest at his hospitable board, where I had the honour of forming his acquaintance, by finding his foot in my soup before being aware of its proximity to my plate.

Mr. Liston is about forty-seven years of age, and though only a recent resident of London, has already much business, and will, no doubt, ere long, rise to the top of the profession. He is professor of clinical surgery in the London University (an institution now nearly equal to that of Edinburgh in the number of its pupils), and has a large and valuable pathological cabinet, I took great pleasure in examining. He is the author, moreover, of an excellent work on surgery, rendered familiar to Americans through the edition, with valuable notes, by Dr. Norris, of this city.

MR. JAMES WARDROP

With Mr. James Wardrop, who, for the last thirty years, has resided in London and enjoyed high reputation as a surgeon, I was well acquainted in Edinburgh. He is a native, indeed, of Scotland, having been born near Linthigow in 1782: but at an early age removed to Edinburgh, and commenced the study of his profession under his uncle, Dr. Andrew Wardrop, for many years an eminent surgeon of that city. Having enjoyed all the advantage attendant upon British schools he repaired to France, during the height of hostilities between that country and England, and contrived, by concealing himself in obscure lodgings near the École de Médicine, to pursue his studies with great success, though in perpetual danger of being discovered by the police, by whom some of his fellow-students and countrymen had been seized and thrown into prison. From France he escaped to Germany, where under the most eminent teachers, especially Beer of Vienna, he reaped additional advantages, and finally, after great privations, was fortunate enough through a passport, obtained for him by his Edinburgh friends, from an American student, since one of the most eminent professors in the United States, to reach his country again and able to impart to his brethren much valuable continental information from which, through fierce and protracted hostilities, they had long been cut off. Soon after his return from the continent, he settled in Edinburgh, became a hospital surgeon, speedily acquired private practice, devoted himself to Anatomy, commenced the formation of a surgical cabinet, and was so full of zeal and enthusiasm in all his pursuits as to bid fair, in a short time to rival the most celebrated surgeons of the place. His ardent temperament, however, and unbounded ambition did not suffer him to remain contented with the comparatively small sphere in which he moved; animated therefore, with the thought of measuring his strength with London surgeons of the first eminence, he sought that metropolis and at once entered, with characteristic enthusiasm, upon professional duty, struck out a new line of hospital practice, by establishing a charitable institution, whose wards were open, gratuitously, to every member of the profession, to whom the right was awarded of bringing his patients and operating upon them one day in each week, before numerous professional visitors and distinguished foreign surgeons, whose counsel and assistance could be commanded to any extent. This institution was continued for eight years, and was only abandoned on account of the great fatigue necessary to carry out the magnitude and importance of the scheme. The result, however, proved so far beneficial by causing the publication, in the *Lancet*, of a great number of extraordinary cases, equally curious and interesting, under the title of "Reports of the Hospital Surgery." But before Mr. Wardrop left Edinburgh he had distinguished himself as a writer, by the publication of an interesting and valuable work, the "Morbid Anatomy of the Human Eye," illustrated by very accurate and most beautiful colored representations of the diseases of the different textures of that organ, by an excellent volume on "Fungus Haematodes," and by numerous essays in the *Edinburgh Medical and Surgical Journal.* Since his residence in London, he has continued to employ his pen on the most important subjects—on aneurism, on the diseases of the heart, on the diseases of the eye of the horse and their treatment, which gained a premium from the Agricultural Society: has furnished an interesting life of the late Dr. Baillie; and contributed, largely, to numerous journals, essays and cases of the most interesting description. With his late Majesty George the Fourth Mr. Wardrop was a great favourite, accompanied him, at the King's request, on his visit to Scotland, attended him, professionally, upon various occasions and in his last illness, and received from him the offer of a baronetcy—which, however, he declined from prudential motives.

I called upon Mr. Wardrop at his residence in Charles Street, and introduced myself as an old acquaintance, and was gratified to find he could have recollected me, after the lapse of so long a time, as one of the companions of his favourite pupil De Souza—a young Portuguese of great talent and promise, who perished prematurely, much regretted by all his friends, and by none more sincerely than by his affectionate preceptor. His appearance was much changed, since I had last seen him, the result, no doubt, of hard work of mind and body in a profession, which of all others requires the most incessant toil and labour, and which is sure to be accompanied with unmitigated suffering and anxiety of mind, even if rewarded with the comforts, such as they are, of extensive practice and professional fame. There was something still striking, however, about his tall, thin, but well-formed figure, his quick, restless, inquisitive eye, and animated, but thoughtful countenance, which interested me exceedingly. I sat an hour with him and listened to his rapid and spirited elocution while he gave a sketch of some of the events of his chequered life, his difficulties and anxieties, his persecutions, as he considered them, his writings, lectures, operations, his amusements, his love for domestic animals, his passionate fondness for horses, their turf performances, their form, action and pedigrees, coupled with inquiries concerning American nags, their trotting feats and peculiarities; in all which he seemed equally interested, often getting out of breath during the details flying from one part of the room to another, and answering questions himself when the response seemed to be coming tardily. Two or three other visits I paid him and invariably found him in the same mood. Upon one occasion, also I met him walking in Piccadilly, near Hyde Park Corner, on a delightful afternoon, when there was an unusual turn-out of splendid equipages and of well mounted equestrians, all of which he appeared to know, intuitively, and of which he gave me more information in half an hour than I could have got, probably, from any other man in London in a week. "Do you see," said he, "that fine-looking old gentleman on that ambling dun-colored cob? That is Young the tragedian, whom you must have seen, formerly, on the stage, or, perhaps, known when he was a surgeon. Is it not strange he would condescend to ride such an animal?" At the same moment a good-looking young man stopped at the Duke of Wellington's door and dismounted from a splendid dark-brown filly. "Ah," he said, "There's something worth looking at. That is the Marquis of Douro—there's blood for you—look at her legs—examine her withers—observe her red-hot eye! zounds! what a pair of ears, like the fingers of a glove;—did you ever see such a back! but come along, I know her stock;—come into the Park, I'll show you a hundred of the same breed. There comes the Queen and that awkward Russian Prince. Look at his long legs, like a pair of tongs. She rides beautifully. See how easy she sits in her saddle and how she plays him off. That's not her best nag either. Her little gray mare has more action; but she has had nothing very fine since she lost her black Arabian—Beauty." And in this strain he continued until it was time for me to call a cab, ride home and dress for a dinner at my friend Guthrie's. With some of the eminent London surgeons Wardrop is not very popular, owing to the belief that he has handled them roughly in the "*Lancet*." Most of them admit, however, his talents, and there are those who place many of his actions to eccentricity and enthusiasm, and make the necessary allowance. There are others, again, exceedingly fond of him, and I confess I saw much to admire and very little to find fault with—after making due allowance for a manner the result of quick perception and natural excitability.

Among other surgeons and physicians whom Dr. Gibson met in England were Dr. John Bostock and Sir Henry Holland. His description of the personal appearance of the latter is rather amusing:

In personal appearance there is nothing striking or commanding about him; on the contrary he is rather diminutive in stature, slender and delicate in frame, and from his pallid complexion and plain dress might pass, readily, for any thing but an Englishman. His head too, as a specimen, is little calculated to sustain phrenological doctrines—making due allowance for the fact, however, that very few who venture to pronounce decisively, in such matters, merely from a glance, or without actual examination and measurement, possess sufficient knowledge to enable them to express an opinion at all; in which number candour might, possibly, compel me to include myself.

After his delightful sojourn in England, Gibson crossed the Channel and passed some time in Paris. As is well known, Paris at that time was a great medical center for American students, and Gibson writes as follows concerning its advantages:

Of the advantages of a residence in Paris for medical purposes, beyond most other cities, I was well apprised, but the real amount and value of such advantages I certainly had no adequate conception of until they were presented to my view, nor could I fully understand why pupils, after having completed their studies in this country, and sailed for Europe in quest of additional information, should, almost to a man, take up their quarters, exclusively, in the French metropolis, and never think, afterwards of attending the lectures and walking the rounds of the English, Scotch, and Irish colleges and hospitals. But I had not been a week in Paris before I understood, perfectly, the nature of the case, by finding that there were hundreds, nay thousands of individuals, employed in demonstrating, teaching, and unravelling, in every possible way, the most intricate subjects, in every branch of our science and art, and for a compensation so exceedingly small, and, oftentimes, without any compensation at all, as to be within the limits of the poorest and most destitute student—that the demonstrations and lectures were carried on throughout every season of the year, and with an energy and enthusiasm, altogether surprising and unheard of in most other European countries—that subjects, owing to peculiar regulations of government, an overgrown population and accidents, and diseases resulting therefrom, were more abundant and cheaper than elsewhere, and that *living*, where the student was really desirous of economising and of employing his time to the utmost advantage, was so cheap as not to amount necessarily beyond a few francs a day. Above all, I found that the regular lectures in the different hospitals and institutions, by men of the first eminence, were paid for by government, and *gratuitous*, as respected the pupil; that the reputation of these men was dependent, mainly, upon the exertions they made in their several departments or lectureships, and that in turn, their chances of obtaining high standing in practice and lucrative employment, was in proportion to their success and celebrity as professors, teachers, and hospital physicians and surgeons; the natural consequence of all which was, that pupils would remain in Paris, where they had little or nothing to pay, and where the advantages were at least equal to those for which in other countries they would be obliged to pay, and their teachers, from having the strongest possible motives for improving themselves and their classes, must necessarily acquire a skill and reputation, at least equal to that of teachers in other parts of the world.

Gibson gives an interesting description of the Latin quarter, which then, as always, was the center of medical activities.

My first visit upon reaching Paris, was to that quarter of the town called the Pays-Latin, in which the greater number of the hospitals, the École de Médecine and its Museum, the Clinical Hospital of the School of Medicine, the Museum of Dupuytren, are situated, where all the medical students and many of the professors, private lecturers, demonstrators, medical booksellers, instrument makers, medical artistes, anatomical workers in wax and papier maché, preparers of natural and artificial skeletons and other varieties of surgical and anatomical specimens, reside; where the streets are so narrow and filthy, and without pavements or side walks, as to endanger life at every corner; where the houses are so high, old-fashioned and gloomy as to resemble jails, or penitentiaries, and nearly shut out the light of heaven; where the Catacombs, those vast depositories of human bones, the accumulated collection of ages, lie beneath the feet, extend to unknown distances, and seem to respond by hollow groans to the tread of the foot-passenger, and rumble beneath the jar of cumbrous vehicles and the tramp of clumsy animals, that are incessantly threading the narrow defiles above their desolate but populous domains; where noisome smells of concentrated vigour and activity and varied odour, assail the olfactories from every quarter; where loud and discordant cries of wandering tribes of vagabonds vending their peculiar animal and vegetable productions, fall upon the sensitive and startled tympanum of the stranger like strokes of the sledge-hammer or harsh gratings of the sawpit; where the barking of dogs, the screams of parrots and the chattering of monkeys, mixed with the gabble of old women and men; where the bowing and nodding, and scraping and salutations and recognitions of street passengers, bobbing against and shouldering each other—followed by the incessant and everlasting apology "Pardon Monsieur," and, in return, by the complacent shrug and grin of the sufferer, and the exclamation "pas du tout," afford the most amusing and melancholy mixture of pleasurable and disagreeable sensation that can possibly be conceived, and have afforded, no doubt, many a scene for the dramatist and painter.

Yet in this very quarter, so different from the fine squares and buildings, and gardens, and broad avenues of other parts of Paris, and separated from them by the intervention of the river, are to be found the dwellings of men whose fame and reputation have extended to every corner of the earth; where the science of medicine in all its branches is taught with an assiduity and accuracy, enthusiasm and fidelity, unknown in most other parts of the world; where the student revels from dawn to sunset, and, if he please, throughout the night, among lectures, dissections, demonstrations and preparations, until he is stuffed and crammed, and saturated with knowledge to such extent, as to leave no room for additional supply; where he may go at almost any moment and witness important operations on the living body, listen to a lecture on the case and the reasons for performing it, and, if with an unfavourable result, have an opportunity of seeing the injection and dissection of the parts, and their mode of preservation; where he may perform with his own hand operation after operation, guided by some able assistant, until he acquires a perfect knowledge of the principles which govern him, the instruments he employs, and the nature of the case in which he resorts to such measures; where, in short, he may be engaged for months, or years, in such varied and useful professional avocations as to be insensible to the disagreeable scenes by which he is surrounded, and to become so attached to the filth and inquinated atmosphere he has been digesting and respiring for so long a time, as to feel almost broken-hearted at the prospect of leaving them.

One morning while Gibson was talking with his distinguished fellow countryman, Eve of Georgia, he received a visit from Velpeau, of whom he writes most interestingly:

I had often heard of Velpeau as a homely, ungainly, personage, with grizzly hair standing up like a shoe-brush, rough in his manners and careless in dress. I found him, however, polite, agreeable, lively, easy and genteel, dressed plainly, but with as much neatness as most other gentlemen. He sat for half an hour conversing with great intelligence and good humour on various subjects; asked numerous questions respecting our medical men, and his former American pupils, whom he named and spoke of with pleasure. In referring to his numerous works, and expressing my surprise that he should find time, engaged as he was in hospital and private practice, to read and quote so many English, American and other foreign books, he replied with an honesty and candor I did not expect, "Oh, my dear sir, you see how little I know of your language, it would be impossible for me to read all these books myself, but I have excellent young friends among your countrymen, and students from all parts of the world, and get *them* to read for me and furnish translations and extracts, and in this way appear as learned as you have been pleased to consider me." I was delighted with this amiable frankness, and afterwards took every opportunity of seeing him at his house and at *La Charité*, where he is principal surgeon. His history is an extraordinary one, and calculated to make a strong impression upon a student who has experienced the hard usage and buffetings of this world, as it will convince him there is no situation in life, however humble, no circumstances however difficult, no misfortunes and entanglements, however complicated, he may not extricate himself from and rise to the highest eminence, provided he is endowed with talent, energy, enterprise and good conduct.

I was walking with my old Philadelphia friend in the *Palais Royal*, in quest of a watch, and struck with the open and honest physiognomy of a middle-aged man, whom we observed through the window so busily engaged at his work as not to perceive us, determined to enter and examine his commodities. After selecting an article of beautiful workmanship, such as we had not seen in any other establishment, demanding the price, and then, according to usage, endeavouring to get at the lowest sum, the man, with a deep sigh and most disconsolate look, said that *his* profession was a most unfortunate one—that for years he had toiled from morning till night poring over the wheels and springs of watches with magnifying glasses, until he had nearly put out a pair of the finest and sharpest eyes God ever made, and by long sitting had injured his limbs and impaired his constitution. "Oh," said he, "that I had been a surgeon, how different might have been my situation!" Then turning, and looking us full in the face, he continued, "Gentlemen, I am a poor individual, without fame or consequence, but my history, inasmuch as it is connected with that of a dear friend, whose reputation is well known all over the world, is nevertheless a singular and interesting one, and for his sake, if you can spare time, I will relate it to you." Struck with the manner and earnestness of the man, and favourably impressed towards him, we took seats in his small shop and listened to his narrative. "I was the son," said he, "of a poor miller, and the father of my friend followed the occupation of blacksmith in the village of Breches and province of Loire, and at an early age we were both initiated in the mysteries of our paternal vocations, he shoeing horses, and I grinding grain from morning till night. In spite however, of the severe labour to which my friend was exposed, he devoted many hours of the night to improving his mind, and twice a week attended a country school three miles off. His father's library consisted of two books—the complete drover and a volume of medical receipts—which the young blacksmith was so enamoured of as to commit to memory, and from that period turned his attention to medicine. He continued, however, to shoe horses, and prescribe for their diseases until his twenty-third year, when growing tired of such labour and burning to distinguish himself in higher pursuits, proposed to me to leave our native village and repair to the Capital, where he was sure, he said, we should both meet with occupations worthy of our toil.

"With scanty means and slender wardrobes fastened to our backs, we commenced our journey on foot, and after a time reached Tours, where the money of my friend giving out, he was obliged to remain and work at his trade, while I pursued my solitary way to the Capital, and meeting with no better employment took up with the villanous business of watchmaking. Several weeks afterwards my friend arrived, and hiring for three francs a black coat, which did not fit, and contrasted strangely with his country garments, waited upon the celebrated Dubois—offering to become his pupil—who, impressed favourably, notwithstanding the ludicrous figure he cut in his long-tailed coat and sky-blue pantaloons, told him he might live among his servants and have the run of his kitchen for some weeks, until he could ascertain the nature and extent of his qualifications. The proposal was joyfully accepted, but before the expiration of the allotted time, my friend gave so many proofs of genius and talent, and worked with such assiduity and success as to astonish Dubois, and cause him henceforward to consider him as a companion and friend. From that moment the fortune of my village crony was made; for, under the excellent Dubois, he not only made astonishing progress in his medical studies, but was so diligent and untiring as to acquire in a short time such knowledge of the classics, and most of the languages of modern Europe, as to read them with facility. So much time, indeed, was devoted to all his pursuits as to render him very careless of his appearance and costume, and I remember how much mortification I experienced from perceiving that my master did not relish the occasional visits of my friend, and especially when he told me upon one occasion I ought to keep better company, for he was seriously afraid that ill-looking fellow would rob his shop. I endeavoured after this to prevail upon my old friend to attend better to his toilet, but he said such matters were beneath a man of science and proofs of a weak mind, and for his part, thought when a coat required brushing it was time to get a new one.

"Since that period only a few years have elapsed, and my country friend, farrier, and blacksmith, is now at the head of the profession in Paris, a distinguished professor and hospital surgeon, the author of large and valuable volumes in every department of the profession, and, withal, a man of fortune. And where," he continued, "am I? Still a poor miserable watchmaker in the Palais Royal and the tenant of this pill-box of a shop, in which you are sitting." And pray, Mr. Jarossay, said I, may I ask who that friend of yours may be? "That friend, sir," said he, slowly rising from his bench, putting forth his right arm, and stamping firmly with his foot upon the floor, "that friend, sir, is not less than the celebrated Velpeau."

The next day I called upon Velpeau, and found him in his study behind a pile of books, which he was pitching with great vivacity from right to left, in search of authorities and quotations for a large work on surgery then in press. He showed me the translation of a letter I had sent him, at his request, detailing the results of certain operations in my own practice, and said he had obtained similar documents from other American surgeons. Before leaving I took the opportunity to ask if Jarossay's story was correct. "Perfectly so," said he, "as far as it goes, he is still my friend, an honest man, and one of the best watchmakers in Paris, of whom you may purchase without hesitation." I returned to the Palais Royal and secured the watch, and commend all in quest of such articles "to go and do likewise."

I arrived in Paris shortly after the revolution of May, 1839, when the hospitals were crowded with gun-shot wounds of every description, in men, women and children, many of them received, accidently, in their houses whilst engaged in domestic concerns, from stray bullets, which found their way into the most retired places. One poor fellow, among the rest, lost his life from a ball which struck him in the neck whilst shaving in a garret of one of the lofty houses on the Quai Voltaire, and which had been fired from the opposite side of the river. Another, a noble-looking man, while shutting the windows of his shop, received a shot in the middle of the thigh, which fractured the bone in a shocking manner. I saw him, among others, on the 11th of June, whilst accompanying Velpeau through his wards. He seemed in a deplorable condition, his skin like wax, and covered by clammy perspiration, his tongue foul, his eyes glassy, his system irritable in the extreme, his thigh prodigiously swollen, each orifice of the wound blocked up by a fungus, through the crevices of which offensive matter streamed copiously. Velpeau was evidently alarmed, and turning to me said, "What do you think of that case, and what would you have done with it in your hospital?" I should have cut it off, I replied, as soon as possible after reaction. "Ah," said he, "that would have given his limb no chance. I have been trying to save it; besides, he was unwilling to part with it; saying, he would rather die than wear a wooden leg. But I believe I must now operate, though it is rather late." Soon after he repaired to his lecture-room and poured forth, extemporaneously, one of the most learned and interesting discourses on spontaneous gangrene, I ever listened to, quoting immense number of authorities with the utmost ease and accuracy, but, in the midst of his fluency suddenly stammered, and, under great embarrassment, said, "Gentlemen, this is the first time I ever forgot a name,"—which was confirmed by the pupils around, some of whom had attended him for years. After lecture, the poor patient with broken thigh was brought in and placed upon the table, and Velpeau, with the long, narrow, double-edged knife, resembling a cut-and-thrust sword, and used by most French surgeons, amputated the limb by forming a double flap, and sawing off the bone two inches above its shattered extremity. The poor fellow gave one loud and agonizing scream and fell back. Velpeau, however, proceeded very deliberately and humanely, and, if not with the despatch of a Roux or Liston, with accuracy and neatness sufficient to prove himself not only a learned lecturer, but a very clever operator. The man through strength of constitution recovered; but nine patients out of ten, in a crowded hospital like La Charité, would have died, and their lungs, and other internal organs, been found filled with metastatic abscesses.

The appearance of Roux is rather singular. He is a dapper, little gentleman of great stir and activity, straight as an arrow, stands bolt upright, and has a peculiar obliquity and twinkling of the eye, which indicate sly humour and self-satisfaction. His complexion is rosy and healthful, his nose thick, turned slightly to one side, and its extremity snub and somewhat bulbous. In person he is remarkably neat and particular, and seems not a little vain of his

> gentleman-like figure and manners. He is very kind, seemingly, to his patients, and I observed a peculiar smile of satisfaction playing over their features as he approached, and in a good-humoured, chirping, way said something to each, by way of pleasantry and consolation . . . . . Roux has long been considered the neatest, quickest, and best operator in France, and although now seventy-one, appears to have lost none of his energy and activity of body or mind. His private practice is very large, and the labour he goes through in the Hôtel Dieu, from seven until ten in the morning, is immense. I saw in his wards several amputated stumps, beautifully formed and nearly closed, through adhesion—also compound fractures of the leg, admirably adjusted, and put up with long narrow splints, and the bandage of Scultetus.

Gibson gives a curious picture of the surgeon Lisfranc:

> Of Lisfranc I saw enough to convince me that many of the reports concerning him are without foundation. He is a big, burly, narrow-shouldered man, more than six feet high, negligent in dress, awkward in gait, uncouth in manners, and loud and boisterous in discourse. In his lectures he is said to be so unsparing of his brethren, and, in hospital practice, so harsh towards his patients, as to be unpopular with both. I cannot say whether those charges are well founded, but am inclined to believe them exaggerated, inasmuch as I saw nothing, beyond the natural want of polish in the man (increased, I thought, by affectation of wishing to appear worse than he really was), from which I should have drawn such a conclusion.

With Cloquet and Ricord, Gibson was much impressed.

> Than Jules Cloquet there are few medical men in France better known as an accomplished writer, lecturer, anatomist, and practical surgeon. Possessed of genius of high order, combined with exquisite taste and skill as an artist, the most finished education, and manners peculiarly bland and attractive, it may be readily imagined such a man could scarcely fail to become eminent. From thorough acquaintance with his splendid folio volumes on anatomy, illustrated by twelve or thirteen hundred lithographic figures, mostly drawn from nature, with his pathological and anatomical researches on hernia, numerous memoirs on various other surgical diseases, and interesting "Souvenirs de la vie privée du Général Lafayette," of whom he was the confidential friend, I felt peculiarly desirous of forming his acquaintance. Through the kindness of Dr. Bertin, one of the most eminent physicians of Paris, I had the happiness to hear him lecture and see him operate at the Hospital of the Faculty of Medicine, where he is clinical professor, but (owing to domestic afflictions, by which he was overwhelmed, at the time of my sojourn at Paris) had no opportunity to enjoy his society; which I regretted the more as I was exceedingly interested by his whole appearance and demeanour. It would be difficult, indeed, to find an individual in any country better calculated to produce a favourable impression upon most minds; for, independently of his eminently genteel figure and air, and his handsome, expressive features, there is something so gentle, quiet, and unpretending about him, as to win, instinctively, every heart, and sufficient to account for the universal estimation in which he is held, even by his brethren, who, in Paris especially, are the last to see and acknowledge merit in contemporaries and rivals.
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> Ricord, notwithstanding his youth, from the high position he holds as a lecturer and hospital surgeon, may be looked upon as one of the most eminent men in France. He is attached to the Hôpital du Midi, in the Rue des Capucins, faubourg St. Jacques, where he delivers clinical lectures several times a week, to crowds of pupils, on the various forms of syphilitic disease —this hospital being devoted exclusively to such complaints, under the management of himself, Manec and Cullierer; the latter of whom has, also, considerable reputation. Than Ricord, however, I have seldom listened to a more eloquent and successful lecturer—being remarkable for the simplicity and clearness of his language, which flows in a copious, uninterrupted stream, with an enunciation so distinct and emphatic as to be understood, with perfect ease, by every pupil and stranger. On this account, as well as his profound knowledge of the subject, his lectures are crowded with Englishmen and Americans, to the latter of whom he is particularly attentive—being, in fact, himself an American, born of French

parents, in Baltimore, where he received his education, and resided, as he told me, until his sixteenth year. This is sufficient to account for his speaking English as fluently as French.

Ricord is now about thirty-five, a tall, fine-looking man, prepossessing and gentlemanlike, and extensively engaged in private practice.

Gibson did not see Baron Larrey.

Baron Larrey, Napoleon's celebrated surgeon and friend, I did not see. He was much indisposed, at the time of my visit, and although possessed of credentials from the Count Survillers which would have secured me a welcome reception, I felt unwilling to trespass upon the old gentleman's privacy at that moment. He is now seventy-five, and lives in great retirement, having never recovered entirely, it is said, his spirits after the emperor's disastrous reverses of fortune—though he still continues, occasionally, to give the profession the result of his vast experience, through the medium of memoirs and other contributions. His son, a young man of reputed talents, is rising into notice, and has already acquired some reputation by his surgical writings, and especially by his account of the seige of Antwerp.

Louis made a great impression on Gibson:

Of all the physicians of Paris, there is no one, perhaps, at this moment, who occupies more elevated ground than Louis. I saw him for the first time, at the Hotel Dieu, going the rounds among his patients, before breakfast, and was particularly struck with his tall slender, erect, and commanding figure; and not less pleased with his open, expressive, and eminently handsome physiognomy—altogether bearing a close resemblance, except in being much taller, to one of our most promising young physicians Dr. B...e. Being, then, too much occupied with his patients to engage in free conversation, he invited me, kindly, to visit him as often as I found convenient; and next day called at Meurice's and sat an hour; asked numerous questions concerning his American pupils; spoke, with tears in his eyes, of the loss our country, and, indeed, the world, had sustained by the death of young Jackson of Boston; repeatedly exclaiming, "Ah! pauvre jeune homme, pauvre jeune homme! il fut un honneure du genre humain, si modest, si bon, si prudent, si affectionné et si obéissant; et cependant, quoique si jeune, it possédait tout le jugement, la sagesse et la connaissance d'un age mûr;" referred again and again to the beautiful tribute paid by his father[1] to his memory; in publishing his letters whilst a student in Paris—letters, he said, not filled, as too common, with the frivolities, and fashions, and amusements of our capital, but written from the hospitals, at the bed-side of patients, containing concise and accurate views of their cases, and this, too, at a time, when surrounded by the dead and the dying, in the midst of cholera, typhus, and other malignant diseases, when most students would not only have fled the hospitals, but even the city. He also inquired affectionately, after Dr. (W. S. Gerhard), of this city, of whom he spoke in terms of high commendation, said he had been one of his best and most attentive pupils, rejoiced to hear of the reputation he had already acquired for knowledge of diseases of the chest and their treatment, and pronounced him, on all professional subjects, "un médicin habile."

The personality and work of the great French orthopedist, Jules Guérin, made a great impression on Gibson:

One of the most interesting surgeons I saw in Paris was Dr. Jules Guérin, editor of the *Gazette Médicale*, and Superintendant of the Orthopedic Institution of Muette—situated at Passy, near the Bois de Boulogne. Accompanied by my friend, Dr. Mott, by whom I was introduced to Dr. Guérin, I spent the greater part of a fine day in ranging over the numerous buildings and apartments of the fine old chateau, now converted to other purposes, and its beautiful grounds of forty acres, ornamented with every variety of tree and shrub, and tastefully laid out with gravelled walks, gardens, lawns, all furnished with every species of rural luxury calculated to please the fancy or benefit the health of those who, from choice or necessity, may seek such an asylum. Here boys and girls of almost every age, but in separate departments, were skipping about full of frolic and glee, some performing complicated evolutions on the tightrope; others ascending inclined planes by the power of their fingers and toes; and all engaged in various gymnastic or callisthenic exercises, admirably calculated to brace and develop the muscles, expand the chest, or strengthen the joints. In other places we saw limbs carefully put up in various forms of ingenious machinery, some calculated to keep ligaments and tendons upon the stretch, others to sustain the entire trunk or limbs and take off the pressure of superincumbent parts; and others, again, to retain, in proper position, parts previously separated by the knife, until the process of adhesion should be established in new situations. Many of the cases, indeed, furnished interesting specimens of spinal disease in all its varieties and modifications—from the simple lateral distortion, to the perfect posterior angular deformity—to correct the former of which division of the tendons or muscles of the back in a few instances had been resorted to. Here, too, we saw Pied-Bot, or club-foot, (displayed in endless tortuosities, or characterized by the most singular and uncommon angularities), either made straight by the division of tendons, or, when the peculiarity of the case did not admit such operation, under the influence of pressure and tension, from machinery or apparatus adapted expressly to the purpose. In more than two hundred instances had Dr. Guérin, as he told us, already performed, with more or less success, the common operation for that disease, the peculiarities and results of which, not resting merely upon his own *ipse dixit*, but confirmed by the testimony of numerous respectable surgeons, who, from time to time examined the patients, or saw, from beginning to end, the treatment. It would be difficult, indeed, to enumerate the various cases of wry neck, muscular contraction, anchylosis, dislocation, and other deformities offered to our inspection, all which were subjected to the influence of mechanical contrivances either invented for each peculiar case, or adapted to it with mathematical precision or nicety, and their action, watched with scrutinizing care and untiring assiduity. From the patients' room we walked to a separate building, a short distance from the chief establishment, containing the museum or collection of morbid specimens of every possible variety of deformity, as well as plaster casts, almost without number, of some of the most uncommon and extraordinary muscular or osseous derangements or irregularities. Nothing could exceed the politeness with which we were greeted by Dr. Guérin, or the zeal and enthusiasm displayed by him in explaining the peculiarities and advantages of the institution under his direction; without, too, exhibiting the least jealousy or fear lest we should carry off one or more of his plans and afterwards report or publish them as our own. Nor was there any invidious comparison between his own institution and others of similar character; nor the slightest attempt to extol or blazon forth the merits of himself and coadjutors; many of whom we saw engaged in their various duties of conducting the education of the patients, while he himself took the sole charge of their diseases, so that they did not lose the benefits of the former, as too often happens, while subjected to misfortune of the latter. Upon the whole, we returned to Paris, after our long visit, highly gratified with all we had seen; and not less pleased with the urbanity, modesty, and gentleman-like address of Dr. Guérin, than with his fine talents, professional learning and skill. He is quite a young man in appearance, not exceeding, I should think, thirty-five, is rather tall and thin, with fine sparkling eyes, and black hair, and most animated joyous expression, very active and quick in his movements, and altogether such a man as would force another, if he had any thing in him, to bring it out, or, in other words, to inspire vivacity—by his own vivaciousness. From all quarters I, afterwards, heard of the superiority of his institution over every other in France; and of his own merit there cannot be stronger proof than the circumstance of his having received from the Academy of Sciences their great surgical prize of ten thousand francs, for the excellence of the principles by which he is governed, and for the superiority of his modes of treating the peculiar diseases, and injuries, and malformations to which he has devoted so much attention.

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[1] The distinguished Dr. Jackson of Boston.

Gibson had the opportunity of seeing the bladder surgery of the two most noted lithotritists of the time, Civiale and Leroy D'Etiolles.

As Dr. Civiale is not less remarkable for his kindness and hospitality than for skill and success as a lithotritist, it will create no surprise when I say that we were received with the utmost cordiality, and invited to accompany him through the hospital, after which we were taken to the lecture-room, and there found two or three calculous patients waiting for him. He commenced by examining one, upon whom he had previously operated several times, to ascertain if any fragment could be found. After repeated injections of the bladder, however, (with which he never dispenses), and very careful search with a straight canula and litholabe, not the smallest particle could be discovered, and the patient was discharged—cured. A second patient then presented himself, and, like the first, without assistance got upon the table, when Civiale, after injecting the bladder, very cautiously and slowly introduced a *percuteur*, of construction peculiar to himself, caught the stone instantly, and as quickly crushed it, again and again, by opening and shutting the instrument repeatedly, and taking fresh hold—without giving the slightest pain, for as soon as the instruments were withdrawn the man jumped off the table with the utmost alacrity, and, with a smile upon his countenance, walked to his room. After this, Civiale commenced a lecture on lithotrity, which continued an hour, during which he explained, in the most minute and circumstantial way, the whole process, and particularly inculcated the importance of injecting the bladder, and using the instrument with the utmost care and gentleness, saying, that all the accidents inexperienced operators had met with, were to be traced to harshness and violence. After lecture, we again walked with him through the wards, and saw numerous cases of stricture, enlarged prostate and other similar affections, all under treatment. Upon reaching the hospital gate, he insisted upon my friend and myself getting into his barouche, and allowing him to escort us home. During the ride he talked chiefly of the frequency of stone in all parts of the world; said it was much more common than was imagined; that many persons died from it who were never suspected, during life, to have had any complaint of the kind; that he had no doubt there were stone cases enough in many of the large American cities to employ two or three surgeons; that a young surgeon of Paris had found in Vienna more than three hundred cases of the disease in less than a year, when few or none were supposed to exist in that city; and concluded, by remarking, that he himself had met with stone in a *new-born* infant, which, upon analysis, was found to consist of three layers, each of peculiar composition. At parting, we received an invitation to dine with him a few days afterwards, saying, "I will then show you my whole collection of calculi, such as I have removed by the knife or reduced to fragments, and all the instruments I have ever found it necessary to employ."

Although prepared, from report, to meet with great dexterity on the part of Civiale, I had no just conception of the extraordinary facility with which he manoeuvred his instruments, until I witnessed the operations referred to. There could not, indeed, have been exhibited more perfect skill in any branch of operative mechanics, than displayed by him upon the occasion, and yet not such as an *inexperienced* person would have estimated, for there was not the slightest attempt at effect, by twisting or turning of instruments, or any aim at feats of dexterity, but, on the contrary, the most deliberate, delicate, graceful movements imaginable, as if the instrument were performing its own evolutions, for it seemed to be *gliding along* under its own weight and power, rather than from any effort of the operator. This, indeed, is the great peculiarity of Civiale, and the foundation of his success; for most operators I had previously seen, hurried as much as possible, without proper regard to the patient's suffering, whereas Civiale watched closely the countenance, and when he saw any evidence of pain kept his instruments still, waited for some time, or removed them, if necessary. The last observation, indeed, he made to me, upon taking leave of him, in Paris, was, "Be as gentle as possible, and do not keep the patient long on the table, and you will seldom experience any difficulty or disaster."

At the appointed time, accompanied by my friend, I waited upon Civiale, but found myself so engaged, in conversing with him and his guests, assembled to meet us, and in enjoying his elegant hospitality—for he lives like a prince, in one of the most splendid and costly houses in Paris—as to have no opportunity of examining his instruments and calculi. After dinner we all retired to the drawing-room, in the middle of which stood a magnificent billiard-table—to which the French gentlemen, speedily, made their way, Civiale among the rest, all anxious to display their skill. I felt curious to know how the great lithotritist would acquit himself in this kind of occupation, and therefore watched his manoeuvres closely, but was disappointed; for he proved himself unequal to his opponent, but bore his defeat with very good grace, while some of his friends, equally unsuccessful, seemed on wires and under the highest excitement. Upon one occasion, when Civiale had been making most strenuous efforts to pocket the balls, I whispered to him, I was sure he could *get them out* of the bag much easier than he could put them in; at which, understanding at once the professional allusion, he laughed immoderately. The next day I spent a long time with him examining his superb collection of calculi and instruments, some of which last he insisted on presenting to me—saying, he wished them to be known to my class. From this period I saw Civiale daily, and witnessed numerous operations on his private patients, which were performed in a style and with a result impossible to exceed.

Some may, after all this, wish to know what sort of a looking man Dr. Civiale is. I answer, in few words, that he is one of the most polished, gentleman-like, and agreeable men I ever met, as simple and unaffected as a child, always good-humoured, and when he speaks has a gracious smile playing over his features irresistibly attractive. He is about five feet eight inches in height, stout and muscular, very active, and handsomely proportioned. His features are regular, and expressive of great energy and decision, his eyes very penetrating, and his hair black as jet. He was a poor boy, without any resources but his genius. He is now one of the richest professional men in Paris—having received immense fees for his operations—is as liberal as he is rich, and in every way deserving of the reputation and wealth he has acquired. He is now forty-nine years of age, and if he lives twenty years longer will have *quarried* half the stone in Europe. To see and know him and witness his performances, is *alone* well worth a trip across the Atlantic.

With Leroy D'Etiolles, the celebrated lithotritist, my acquaintance was not less intimate, perhaps, than with Civiale. Through his unwonted assiduity in calling for me—frequently before six in the morning—I witnessed a number of his operations on private patients, and in hospital practice, all which were performed with the utmost dexterity, and a success that almost invariably crowns his efforts. The first operations I saw him perform were on the 21st of June, at the clinical hospital of the School of Medicine. His instruments differ, in many respects, from Civiale's but are all intended to answer the same ends. Leroy D'Etiolles, indeed, is the inventor of a greater number of ingenious instruments for many surgical purposes, besides lithotrity, than any other man, perhaps, in France.

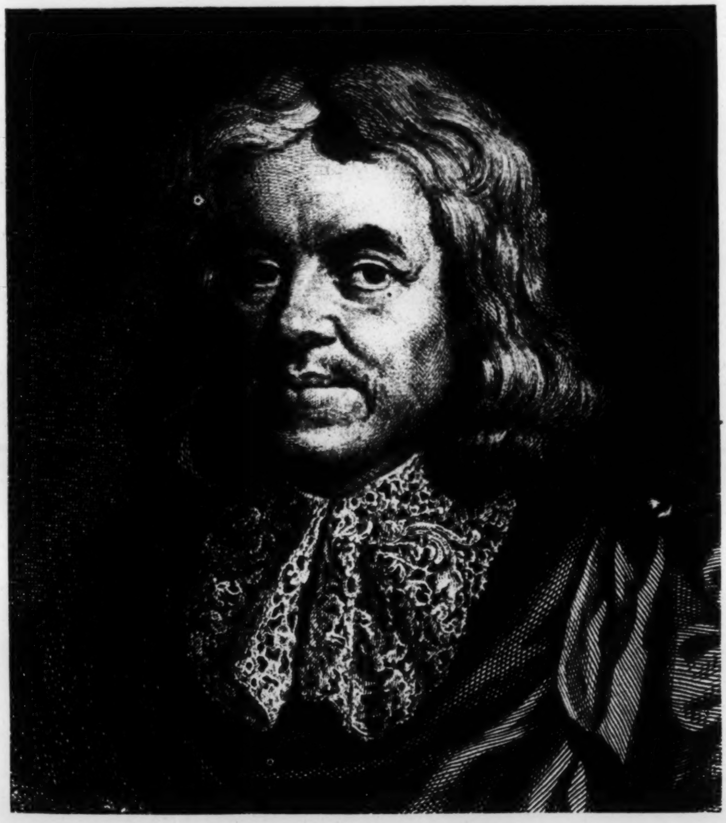
In person he is rather spare, below the middle height, well-formed, muscular, remarkably quick in his movements, and able apparently to encounter great professional labour. His features are large, prominent, full of animation and gaiety, and indicate great quickness of thought and talent. He is a fine scholar and writer, speaks English fluently, as well as other languages, is engaged in extensive practice, and enjoys the highest reputation, not only in Paris, but throughout Europe, for his share in advancing lithotrity. He is, moreover, an accomplished gentleman, admired and respected by all that form his acquaintance, and would hold high rank in the profession and in society, in any part of the world.

THOMAS SYDENHAM, CLINICIAN*

By DAVID RIESMAN, M.D.

PHILADELPHIA, PA.

IF the soul of Thomas Sydenham exists somewhere in the cosmos as a conscious essence, it will be surprised to learn with what acclaim the birth of the body that once housed it is being celebrated. In the Old World that it knew, and in the New World, of which it knew little, learned societies everywhere are praising the name of Sydenham. In his life he was a modest man, like all the truly great, and cared neither for the plaudits nor the scoffing of men. Why is it that three hundred years after his birth the world does so greatly honor him?



Thomas Sydenham (1624–1689).

To answer this question it is necessary to understand the time in which he was born and the state of medicine as he found it.

Politically England was in a great ferment. The glorious reign of Elizabeth and the less glorious reign of James I had been followed by that of the incompetent, despotic Charles. The Puritan movement was growing daily, and with it the rebellious spirit in Parliament against an incapable, Constitution-defying government. Eventually civil war broke out between the Parliamentarians and the Royalists. Sydenham's family were native to Dorsetshire, an intensely Puritan county, which Lord

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Clarendon called the most malignant place in England. No wonder that young Sydenham felt impelled to leave Oxford, where at Magdalen Hall he had matriculated, to take service in the army. Just what he did is unimportant, even were it definitely known. In 1646, when he was twenty-two years old, a chance remark of one Dr. Thomas Coxe, who was ministering to his brother, William Sydenham, a distinguished soldier, led him to take up the study of medicine at Oxford. He was graduated with the degree of Bachelor of Medicine, and was soon afterward installed as a Fellow in All Souls College in place of an expelled Royalist.

Some time previous to 1661 he removed to London and settled in Westminster, becoming a Licentiate of the Royal College of Physicians in 1663. Fellowship in that august body never came to *him*, next to Harvey the greatest of seventeenth century physicians.[1]

A good deal of controversy has arisen about the causes of Sydenham's failure to receive Fellowship in the College, which later placed his bust in front of its doors. One reason undoubtedly was that not having a doctor's degree he could not legally receive Fellowship. Secondly, Sydenham was indifferent to public honors. Not that he was obtuse to praise or blame. In several places in his writings he strongly denounces his detractors, little willful men who envied his success in practice, and either from jealousy or from lack of insight condemned his views. "Approval of this sort [of his efforts] has little been my lot,"[2] and continuing (the bitter note is evident): "I have weighed in a nice scrupulous balance whether it be better to serve men or to be praised by them, and I prefer the former."

In his letter to Dr. Thomas Short, prefacing the famous treatise on gout and dropsy, he says:

> If this dissertation escape blame both from you and those other few (but tried and honorable men) whom I call my friends, I shall care little for the others. They are hostile to me simply because what I think of diseases and their cures differs from what they think. It could not be otherwise. It is my nature to think where others read; to ask less whether the world agrees with me than whether I agree with the truth, and to hold cheap the rumours and applause of the multitude.

In 1676, when Sydenham was fifty-two years old, he took his degree of Doctor at Cambridge as a member of Pembroke College. His reason for selecting that University rather than his Alma Mater, Oxford, was probably, as suggested by Dr. Latham, that his eldest son had two years previously been admitted a pensioner of Pembroke.

The obscurity in which much of Sydenham's life history is cast extends to a supposed visit to Montpelier. It is believed he went there while taking a wealthy patient to the Continent. The great teacher at Montpelier at this time was Barbeyrac, called the French Hippocrates, who may have had influence upon Sydenham. John Locke also studied under Barbeyrac.

When Sydenham came upon the scene, medicine, both as a science and as an art, was showing little progress despite the many centuries that had passed since the time of Hippocrates. As a science it was still under the sway of Aristotle, Galen and the Arabians, although Galen's prestige was rapidly waning as the result of the publication of Vesalius' "De Fabrica Corporis Humani." It was the duty of the regius professor of Oxford to read and lecture twice weekly from the text of Hippocrates or Galen.[3] That gives an idea of the medical instruction in England in the middle of the seventeenth century.

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[1] The experience of Sydenham reminds me of a work by Arsène Houssaye, "The History of the 41st Chair of the Academy." The French Academy consists, as you know, of but forty members, the Immortals, and Houssaye sketches the history of some of the many men, eminent in literature and art, who deserved but failed to obtain the coveted honor of membership and has represented them as occupants of the forty-first Chair of the Academy. Dr. John Ashhurst refers to this work in his delightful Centennial address before the College of Physicians of Philadelphia, and mentions the names of a number of distinguished men who failed of election to the College, among them Physick, Dorsey, Barton and Gibson.

[2] Works of Thomas Sydenham. London, II, 117.

Harvey's monumental discovery was given to the world in 1628 but was very slow in winning adherents, particularly in England. Sydenham himself does not once refer to Harvey, although their lives overlapped, and they lived in the same city for a number of years. This attitude of Sydenham's is at first sight difficult to understand, but certain facts help us to solve the riddle. Sydenham had no patience with theories and saw little in the speculations founded on the new physiology but carried to an excess not contemplated by Harvey.

In addition to the school that concerned itself with physiologic speculation based at first only on mental processes and not on experience, and therefore distasteful to the practical-minded Sydenham, medicine offered the diverting spectacle of a wordy conflict between two schools, the iatrophysical and the iatrochemical. The latter had as its chief exponent Francis de le Boë Sylvius—he of the Sylvian fissure—an able clinician, abler indeed than those who adopted his theories. Sylvius believed that fermentation was the essence of disease and that it produced either an acidity or an alkalinity of the bodily juices—a simple hypothesis that made treatment simple. All that was necessary was, on the principle of *contraria contrariis*, to bring about a change in reaction. Some echo of this school is discernible in the phrase "uric acid diathesis," so popular a few years ago, and the school has in a sense been revived under a new dress, that of acidosis and alkalosis.

In three hundred years from now, our own cocksure views on these questions will probably seem as fantastic as those of Sylvius and his followers are to us.

The iatrophysisists, the opposing school, sprang more or less directly from Harvey's discovery of the circulation of the blood. If it was possible to explain one of the most important functions of the body on a mechanical basis, was it not natural to look for simple physical explanations for all bodily processes?

In many respects this school was superior to the other, and did more for the immediate advancement of medicine. I need only refer to the pioneer work in metabolism of Sanctorio Santoro (1561–1636).

The mechanistic conception was carried to its highest pinnacle by Georgio Baglivi[4] (1668–1707), who by comparing the arteries and veins to hydraulic tubes, the heart to a piston, the glands to sieves, the thorax to a bellows and the muscles to levers, believed that all functions could be explained on a purely physical or mathematico-physical basis. He forgot entirely that all bodily functions are associated with chemical processes. It should, however, be said to his credit that he did not allow his speculations to govern his practice, and in its exercise gave due heed to the data of experience.

The trouble with those schools was not so much faulty philosophy (in truth, their speculations became the basis of great subsequent advancement), but it was rather their neglect of the fundamental thing in medicine—observation at the bedside. Primarily philosophers and secondarily clinicians, they classified diseases in the seclusion of their studies and not on the basis of sober bedside observation. How far such classification may be carried is perhaps best shown in Sauvage's attempt to arrange diseases after the manner of botanists. As a result he enumerated 2400 different species of disease in his nosology.

William Cullen, the foster father of the Medical School of the University of Pennsylvania, greatly simplified this cumbersome classification but did not really get rid of the idea of a rigid system.

With the science of disease in such dire straits, the treatment of disease could hardly be much better. Molière, in his caustic satire upon the medical profession, did not overshoot the mark. The men who pompously cited Hippocrates and Galen as the *ultima Thule* of medical knowledge were content with quoting and neglected to imitate the Father of Medicine and the great sage of Pergamos—to study disease in the sick.

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[3] In Oxford the leading professor of medicine in Sydenham's time was Sir Thomas Clayton.

[4] Called "The Italian Sydenham."

Paracelsus, the iconoclast, signalized his first public lecture in Basle by burning the works of the ancients as a mark of his contempt. While he was an acute observer and noted in particular the diseases of mine workers, his descriptions are crude and erratic.

There had been sporadic instances of accurate description of disease from personal observation before the time of Sydenham. Francis Glisson (1597–1677) gave what is even today the best account of rickets, the English disease. Sydenham, however, was indubitably the first real clinician of modern times, the first since Hippocrates to observe and to note the lineaments of disease and to record what he saw with unsurpassed objectivity.

On beginning the study of his works, I was somewhat prejudiced. I had felt that because he had written in Latin, the universal language in his time, his works had had an adventitious circulation and a popularity they would not have enjoyed had they been composed in the vernacular. But I had not read far when I was obliged to change my mind. I now feel that Sydenham deserves all the posthumous fame that he is getting. Knud Faber[5] is right when he says that Sydenham first concisely and clearly gave clinical observation its place of honor as a scientific method, and Chauffard,[6] speaking at the Commemoration meeting of Sydenham's Tercentenary in the Académie de Médecine a few months ago, uttered similar words of praise. Charles Singer calls him the greatest clinical observer since Hippocrates.[7]

Sydenham has been accused of ignorance by some, and of Paracelsian vanity by others, because he does not quote his contemporaries and very rarely the ancients.[8] Neither of these reproaches is to my mind justified. Like Abraham Lincoln, Thomas Sydenham was an autochthon. His feet were planted firmly on the ground. He observed with incomparable eyes, wrote down what he saw in clearest language, and reasoned sanely upon the data of experience but did not speculate. He reminds me of that laconic marshal of the great Napoleon, who, when an aristocratic subaltern expatiated on the achievements ot his ancestors, curtly replied: "Nous sommes ancêtres nousmêmes."

As a clinician, meaning thereby a man who understands the course, the prognosis and the treatment of disease, Sydenham had no rival in his day and I doubt whether later ages have produced one. When he describes the gout or the smallpox, his word-pictures are unsurpassable. What could such a man have gained by dragging in Hippocrates or Galen or Rhazes? I am afraid much of the medical writing of our time suffers from being overweighted with citations of this or that obscure German or French or Scandinavian or Japanese writer. It is refreshing to find a medical essay detailing in simple language the experience and well-reasoned conclusions of an independent thinker. That sort of non-slavish thinking is rather an English trait connected probably with the Englishman's love of liberty, with his independence as a political being.

Heine once said: "The Englishman loves liberty as his wife; the Frenchman as his mistress; the German as his grandmother." A thousand years of that relationship is not without influence upon the modalities of thought.

It is evident from the minute account Sydenham gives of the course of diseases that he either watched at the bedside of his patients with notebook in hand, or recorded what he saw soon after, or that he had a phenomenal memory.

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[5] Faber, K. Nosography. New York, 1924.

[6] Chauffard, Aesculape. Paris, 1924.

[7] Singer, C. Legacy of Greece.

[8] Sydenham mentions Hippocrates about a dozen times and Galen only once.

Sydenham drew a sharp distinction between acute and chronic diseases. He sees in disease, particularly in the acute forms, a sort of battle between the forces of Nature resident in the patient's body and the noxious agents. These agents arise within the body in consequence of faulty digestion or faulty mixture of the bodily juices. Diseases are chronic because the reaction of the body against the harmful agent is slow in developing, or because the agent continues to act over a long period. He lays much stress on bodily disposition and age and sex and season and climate, and their influence upon the course of disease. In these various respects Sydenham saw much more deeply than his contemporaries. Sydenham's definition of disease shows a truly remarkable insight. It is as follows: "An effort of Nature, striving with all her might to restore the patient by elimination of the morbific matter."

Sydenham's observations on smallpox are among the best we have. Nothing that a keen mind and the unaided senses could detect escaped him. He shows the difference between discreet and confluent smallpox, emphasizing the grave prognosis that is signified by a profuse eruption on the face. He clearly describes the secondary fever. "The more the pus, the more the fever." The meaning of convulsions in the offstart of smallpox, as also in other exanthemata, was well known to him:

> I think that thousands of infants have died because their physician was not aware that convulsions of the kind in question are nothing but the forerunner of some eruptive disease, so that as long as practitioners carelessly mistake such symptomatic phenomena for essential diseases, they throw obstacles in the way of the eruption.

His treatment of smallpox brought him into bitter conflict with his contemporaries and led to the accusation of Sectarianism. But that did not deter him, the more so as his results were remarkably good. Stated briefly, the method he adopted was the cooling treatment. In the first few days, he permitted his patients to be up out of bed unless the eruption was confluent; he allowed fresh air to enter the sick room and gave to the parched patients cool drinks "against the act of nurses and lookers-on."

It took courage to do this, just as two hundred years later it required courage on the part of Graves of Dublin "to feed fevers."

On malaria and ague his ratiocination was exceedingly keen. He speaks of quartan, tertian and quotidian intermittent, and says that the quotidian might in reality be double tertian, a point definitely proved correct over two centuries later.

His description of the severe neuralgia which sometimes is the last symptom of a malarial fever, and his determination of the fact that it really belongs to the disease and must be treated in the same way is a remarkable example of close thinking. The neuralgia is sometimes so severe and so different from what has gone before and so remote from the beginning of the disease, that it seems more like a separate morbid condition; but Sydenham perceived its actual relation to the disease.

Sydenham wrote a short article on the plague, but not from personal experience, for he was not in London during the epidemic. Posterity has censured him for his flight from the stricken city. It must be confessed that in those trying times the leaders of the profession did not set an inspiring example. A few only remained, among them Francis Glisson and Thomas Wharton, the discoverer of Wharton's duct. Poor Thomas Wharton! The king promised him the first vacant appointment of Physician in Ordinary to the King if he would remain in London and attend the Guards. Soon after the plague had ceased, a vacancy in the promised office occurred and Dr. Wharton proceeded to Court to solicit the fulfilling of the engagement. He was told that his Majesty was under the necessity of appointing another person, but to show his appreciation of Dr. Wharton's services, he would order the Heralds to create him an honorable augmentation of his paternal arms. For this empty honor (a canton or, in the dexter quarter) he paid ten pounds. Put not your trust in princes!

Sydenham's motives are unknown to us and we can only guess at them. He makes reference to the incident in the following words: "The danger came to my own doors, and I was persuaded by my friends to add myself to the increasing list of fugitives. I and my family retired a few miles from London. I returned, however, earlier than my neighbors; and, as the calamitous violence of the disease still continued, I was necessarily called in, for the want of a better practitioner, to the relief of the sufferers."

I might perhaps quote one particular paragraph from the article on plague since it shows how cogently and how profoundly he thought on medical problems. Speaking of sporadic cases of the disease he says:

> I have grown suspicious that the mere atmospheric constitution however much λοιμώδης is by no means sufficient, in and of itself, to originate plague. Either the disease itself must continue to survive in some secret quarter or else, either from some fomes or from the introduction from pestilential localities of an infected person, it must have become extended. And even in these cases it cannot become epidemic, except with the conditions of a favorable atmospherical diathesis.[9]

His description of phthisis or consumption is brief but admirable:

> The cough betrays itself. The phthisis comes on between the eighteenth and thirty-fifth years. The whole body becomes emaciated. There is a troublesome hectic cough, which is increased by taking food, and which is distinguished by the quickness of the pulse and the redness of the cheeks. The matter spit up by the cough is bloody or purulent. When burnt, it smells fetid. When thrown into water, it sinks. Night sweats supervene. At length the cheeks grow livid, the face pale, the nose sharp. The temples sink, the nails curve inwards, the hair falls off, and there is colliquative diarrhea, the forerunner of death.

It is interesting that a man so keen with his eyes should not have thought of listening to or percussing or palpating the chest, and that more than one hundred years were required for medicine to hit upon these essential methods of investigation.

Sydenham's account of St. Vitus' dance, called Sydenham's chorea the world over ever since, is another leaf in his laurel crown as a great clinician:

> St. Vitus's dance is a sort of convulsion which attacks boys and girls from the tenth year until they have done growing. At first it shows itself by a halting, or rather an unsteady movement of one of the legs, which the patients *drags*. Then it is seen in the hand of the same side. The patient cannot keep it a moment in its place, whether he lay it upon his breast or any other part of his body. Do what he may, it will be jerked elsewhere convulsively. If any vessel filled with drink be put into his hand, before it reaches his mouth he will exhibit a thousand gesticulations like a mountebank. He holds the cup out straight as if to move it to his mouth, but has his hand carried elsewhere by sudden

[9] It is interesting to note that during the Great Plague in London the popular suspicion fell upon dogs and cats as the carriers of infection and these animals were destroyed by the thousands. No attention appears to have been paid to rats (Bell, W. G., The Great Plague in London in 1665. Lond. & N. Y., 1924). Yet the classical ages, as Bell reminds us, seem to have had some glimmering of the truth, for the God of Plagues was Apollo Smintheus, Apollo the rat destroyer. In Biblical literature, Samuel 1, vi, a reference occurs which is very singular in the light of our present knowledge. The Philistines having defeated the Israelites in battle, they carried off the Ark of the Covenant to their city of Ashod, where thereafter pestilence broke out: "And he smote the men of the city, both small and great, and they had emerods (buboes) in their secret parts." The afflicted Philistines consulted their priests and diviners, who advised that the Ark should be returned to Canaan, and not empty. Then said they: "What shall be the trespass offering which we shall return to him?" They answered: "Five golden emerods, and five golden mice, according to the number of the lords of the Philistines: for one plague was on you all, and on your lords. Wherefore ye shall make images of your emerods, and images of your mice that mar the land; and ye shall give glory unto the God of Israel; peradventure he will lighten his hand from off you."

jerks. Then, perhaps, he contrives to bring it to his mouth. If so, he will drink the liquid off at a gulp; just as if he were trying to amuse the spectators by his antics.

Sydenham's treatise on gout is unsurpassed, as it well might be, for he had himself suffered from the disease for thirty-four years. The essence of the disease is a faulty concoction of the juices of the body, which is about as near as we can come to it at the present day. Only we say proudly, it is a disturbance of metabolism.

Sydenham says gout rarely attacks fools, but modestly adds that "those who choose may except the present writer."

In the treatment of gout he says the man must be made anew:

> It is not as in acute disease, when a person in full health is smit with fever, and falls headlong into a dangerous disease. Gout is different. For years together a man has drunk and feasted—has omitted his usual exercise, has grown stout and sluggish, has been over studious or over anxious; in short has gone wrong in some important point of life. Whatever the treatment, medicine, diet, exercise, it must not be taken by the by, but must be steadily and diligently adhered to. The patient should keep the mind quiet and not be too intent upon serious matters.

Can you not imagine the influence such a sane counselor must have had on the great and wealthy that came to him for advice? Too many physicians of our own day are content to write a prescription for gout or any other ailment, and neglect to give the far more important advice, "to keep the mind quiet."

> As to liquors in gout, those are the best which neither sink to the weakness of water nor rise to the density of wine, such as the London small-beer, either with hops or without hops. First as to wine, the old saw is, "If you drink wine, you have the gout, and if you do not drink wine, the gout will have you.

The first is true enough.

The prohibitionists could have no better defender than Sydenham. "Water drinkers," he says, "scarcely know what gout is. Indeed, it is the natural drink of the greater part of mankind—more happy they in their poverty than we in our wealth and abundance." That does not prevent him, however, from praising the virtues of Canary wine.

For the benefit of those who may be affected in the same way he was, he gives the following advice:

> On getting out of bed I drink a dish or two of tea, and ride in my coach till noon; when I return home, and refresh myself moderately (for moderation is the one thing to be always and most strictly observed) with some sort of easily digestible food that I like. Immediately after dinner, I am accustomed every day to drink somewhat more than a quarter of a pint of Canary wine, to promote the concoction of food in the stomach, and to keep away the Gout from the bowels. After dinner I ride in my coach again, and (unless prevented by business) drive two or three miles into the country, to breathe a purer air. [One of his favorite drives was to Acton.]
>
> A draught of small beer serves for my supper, and I repeat this when I am in bed and about to compose myself to sleep. My object in taking this draught is to cool and dilute the hot and acid juices lodged in the kidney; out of which the stone is formed. Both at this time and at dinner, I prefer the hopped, however thin and mild. For even if that made without hops be better fitted by its greater softness and smoothness to remove a stone already formed in the kidneys; still the hopped beer, on account of the slightly styptic quality which the hops impart to it, is less likely to generate sandy or calculous matter, than that without hops, which is of a more slimy and muddy substance. On the days when I take a purge, I dine on poultry but drink my Canary as usual. I am careful to go to bed early, especially in the winter, nothing better than early hours to accomplish a full and perfect concoction and to preserve that order and even course of life which we owe to nature. Late hours on the other hand, diminish and corrupt the concoctions in old men who suffer from any chronic disease. One precaution I always take to prevent hematuria whenever I drive any distance over the stones (for on the level road I feel no discomfort) is to drink a full draught of small beer upon getting into my coach, and also, if I am out alone, before my return.

Speaking of hysteria he said:

> Such male subjects as lead a sedentary life and grow pale over their books and papers, are similarly afflicted, since however much antiquity may have laid the blame of hysteria upon the uterus, hypochondriasis is as like it as one egg is to another. The frequency of hysteria is no less remarkable than the multiformity of the shapes which it puts on. Few of the maladies of miserable mortality are not imitated by it.

In the treatment of disease it was with Sydenham a cardinal principle to interfere as little with the *vis medicatrix naturæ*. He adopted as his own the fundamental concept of Hippocrates, γούσωγ φύσεις ἰαῖροι. ("Nature is the healer of diseases.")

In actual practice Sydenham used simple, homely methods by preference and, far in advance of his time, would refrain from giving any medicine when the course of the malady was satisfactory.

His only rule in practice was: "What is useful is good." This explains the recourse he at times had to strange proceedings, such as the application of a kitten or puppy dog to get warmth to a patient, or even of a boy or girl as the case might be.

As an example of this method of treatment, we may quote the "Methodus Medendi morbos per accubitum junioris" ("Putting a child or young person to bed with an invalid"); with the idea apparently that the natural heat of the human body had some specific virtue. Several cases are recorded in Sydenham's own English.

> One Mr. Little had a fever about seven weeks, and at the time was so far spent that his doctor judged him a Dead Man. He was ancient, and having been treated with violent medicaments, was as weak as ever I saw any that recovered. Other treatment having failed, I told his wife that nothing could preserve his life but the putting a boy to bed to him. So she procured a Link Boy to lie very close to him all night. The next morning I found his fever almost off, and his eye and countenance more lively, upon which I pronounced all danger to be over. Yet afterwards, upon the recess of the boy, he began to relapse, but the boy being got again, without any more treatment he perfectly recovered.

The same way he cured Bishop Monk's lady, an aged woman of a very feeble and thin habit of body, so weakened by an ague that her physicians looked upon her as dead. Sydenham told the doctor nothing could save her life but a speedy transplantation of some young spirits upon her. Accordingly a girl of thirteen years was put in close to her breast, upon which she recovered very speedily. Unfortunately the girl fell sick, which was attributed to her lying with the lady; but Sydenham was confident to the contrary, and the girl in the end got well.

His honesty is refreshing. He had had success in some cases of dropsy with syrup of buckthorn, so once when he was called to see a patient with the dropsy, he prescribed the syrup. "After a time, as the water remained the same, the lady changed my services for those of another physician, who after my dismissal gave her more appropriate remedies, and cured her accordingly."

Sydenham looked upon fever as a wholesome process, as Nature's way of neutralizing the injurious matter causing acute disease. He therefore did not believe it wise under ordinary circumstances to combat fever. This judicious practice was forgotten, and two hundred and fifty years after him men tried with antipyrin and antifebrin to combat fever.

In his prescriptions he did not depart from the polypharmacy of his time. There is a deal of poetry in his treacles and mixtures, but one pities the poor patient who had to swallow such stuff. For example the Venice treacle, which he used extensively, contained sixty-five ingredients. The famous theriacum was even more complicated, being composed of seventy-two constituents. The preparation of this far-famed remedy required about three months and the Senate of Nuremberg would usually declare a public holiday when it was finished.

Sydenham was fond of emetics and clysters and cathartics, but generally averse to sweat-producing methods.

While not the original introducer of Peruvian bark, he did much to popularize its use; this also applies to laudanum, which he prescribed extensively, always watching the effect of every dose.

Sydenham was a free but not a reckless bleeder, using the procedure as each individual case required. Perhaps he went a little too far in the case of rheumatism, for Dr. R. Brady in a letter to him says: "In the treatment of rheumatism you have prescribed free and frequent bleedings. I would ask whether some method less prodigal of human blood (and at the same time equally certain) may not be discovered." His views on mineral water also testify to his common sense. This is what he says about them:

> I will now venture an opinion that, although in such waters iron in its soluble principles is present, so that what we drink is neither more or less than iron in a liquid form, the waters themselves are merely simple waters, except so far as they are impregnated with the minerals through which they pass. This will be clear if we only throw some horseshoe nails in a few gallons of common water.

Sydenham discusses venereal disease in a letter to Dr. Henry Paman. In this letter I find that it was not considered in Sydenham's time proper to teach the cure of venereal disease. As in most things, he took the contrary view, and says: "I will state what I have observed and tried in the disease in question; and that not with the view of making men's minds more immoral, but for the sake of making their bodies sounder. This is the business of the physician."[10]

He is against ascribing the origin of syphilis to the American colonies, because the disease was not rarely found to develop in negroes on slave ships before America was reached. Like all men of his day, and for generations afterwards, he used mercury up to the point of salivation.

More than any other man of his time, Sydenham laid emphasis upon diet and hygienic measures. Those of us who are today engaged in the practice of clinical medicine can take a lesson from him in this respect. He may not always have been right, but his attention to details, his precise directions, his conviction of the value of the measures he has tried must have carried great weight.

To show his good commonsense, I would quote the case of "a gentleman equally favored by nature and fortune," who had had a fever. It evidently left him in a state of profound neurasthenia, for he burst out into a flood of tears at the time of Sydenham's visit.

Sydenham says:

> I laid his complaint partly to the disorder of his spirits, partly to the length of the previous fever, partly to the evacuations that had been necessary to his treatment, and partly to the interdiction of animal food by which his physician was guarding against a relapse. I pronounced him free of all fever, and recommended a roasted fowl for dinner, and allowed him a moderate share of wine. This he took, and went on afterwards with animal food in moderation. He never again so suffered.
>
> Once a man in Holy Orders came to me suffering from hypochondriasis as the result of overstudy and overwork. When he consulted me I saw at once that there was no room for medicine. I recommended riding on horseback, at first short rides such as his health would allow.

Had he been a man of less acute judgment, he would never have been induced to try it. He went on and on until he had ridden more than a thousand miles, by which time he had gained perfect health and vigor.

"Riding is as good in decline or in phthisis as in hypochondriasis. It has cured patients whom many medicines would have benefitted as much as many words and no more."

What his opinion might have been of Christian Science and Faith Healing is indicated in the statement that the dogma of the most insolent Stoic will relieve hysterics and hypochrondriacs just as much as a toothache is relieved by a resolution forbidding one's jaws to give pain.

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[10] Sydenham's Works. Vol. II.

While Sydenham had few actual pupils (Sir Hans Sloane and the famous Dover of Dover's powder seem to have been among them), he nevertheless became a great teacher and the founder of a school which persists until our day. His fame spread more rapidly on the Continent than in England, and at the University of Leyden the great Boerhaave took up the methods of Sydenham. From Leyden they travelled to Vienna, then to Dublin and then to America. In Scotland they never took the same foothold, probably because the Scottish mind has a more speculative character.

I must tell the story of Sydenham's answer to Dr. Richard Blackmore, although Munk ("Roll of the Royal College of Physicians") questions its truth. When Blackmore asked Sydenham what books he should read to gain a knowledge of medicine, Sydenham's reply was: "Read Don Quixote. It is a very good book. I read it myself still."

Prof. R. A. Millikan recently[11] said that science walks forward on two feet, theory and experiment. Medicine also walks forward on two feet, observation and experiment—clinic and laboratory. Like physics, medicine has entered on a new era. Not only is the clinical method of Hippocrates and Sydenham carried to a high degree, but the laboratory, unknown to both men, has become the indispensable handmaiden of the clinical method. Sometimes it seems indeed as if the positions had been reversed, the laboratory assuming to be the more important. That, however, is a false and dangerous situation against which those who call themselves descendants of Thomas Sydenham must protest. The basis of the practice of medicine will always be the study of disease at the bedside by every available method, and since Sydenham is the archtype of those who believe that the most successful way of studying disease is at the bedside, his name will forever endure.

The epitaph on his monument in St. James' Church, Westminster, is magnificent and true:

"Medicus in omne aevum nobilis." (A physician famed throughout the ages.)

[11] Millikan, R. A. *Scribner's Mag.*, Jan., 1925.

CURIOSITIES FROM THE COLLECTION OF CALCULI

IN THE MUSEUM OF THE ROYAL COLLEGE OF SURGEONS*

By ALEXANDER RANDALL, M.D., F.A.C.S.

PHILADELPHIA, PA.

WE are prone in our modern atmosphere of precision, in urology to overlook the difficulties and trials of the surgeons of the elder day—their perplexities and yet their wonderful diagnostic intuition, their uncertainties and yet their profound faith and marvelous perseverance, their surgical handicaps and yet their remarkable speed, dexterity, skill and astonishing results; all these should be constantly brought back to us as incentives to do better work with our tremendous modern advantages. And are we not also too apt to form our judgment of their abilities as though they were our contemporaries? The precept, "Never judge your fellow man until you find yourself in a position similar to his," could not be better applied than when we undertake an appreciation of their work in their day. So to equalize the sphere of the surgeons which I am about to present to you and our time, absolve yourself of any knowledge of the *x*-ray and the cystoscope, of ether and chloroform, of the electric lamp and even the oil lamp; purge your mind of your knowledge of and familiarity with the open peritoneum, of asepsis, of hemostasis and of antiseptics, forget there are such things as rubber drainage tubes and flexible catheters, and then listen to the exploits and successes of the early lithotomists.

What impresses you first, in reading of their work, is the enormous number of operations they were able to perform. It is true, of course, that where there was one in their day there are ten today, but on the other hand, the density of population was less, travel was limited and slow, and the dissemination of knowledge was slower. A second impression that repeatedly startles one is the remarkably low mortality that attended such a serious and vital operation as lithotomy. Speed was considered an absolute essential and was so highly developed and so thoroughly instilled, that today we are just emerging from under its dominant law.

Cheselden performed twenty-seven lithotomies without a death, lost his twenty-eighth patient and then continued with thirty-one more without mortality. A record one would be proud of today!

Le Cat, by the lateral operation, in seventeen years' time operated upon 157 without a death and a second series of ninety without mortality.

Jacob Van Diden of Utrecht had only four deaths in one hundred operations, and sixty-six in succession without a death. It is of interest that he wounded the rectum in three of these but all of them healed.

Then there is Frère Jacques, that picturesque itinerant monk, hounded out of France because he had twenty-three deaths in sixty cases. Wandering to Holland, he there perfected his operation and returned to France to obtain complete recognition after performing thirty-eight operations and obtaining thirty-eight cures. Frère Jacques is credited with having performed 4,500 lithotomies. One of the most amusing incidents in his hectic career was when he was called to operate upon the Maréchal of Lorges. He found the old gentleman loath to submit until the operator's skill had been proved upon some of the lesser lights in the court; Frère Jacques thereupon performed twenty-two lithotomies without losing a single case; the Maréchal then submitted and promptly died the day following his operation.

The first catalogue of calculi contained in the Museum of the Royal College of Surgeons was made in 1842, at which time 600 specimens were in the collection. A second catalogue was made in 1871 and covered 1,005 calculi, the vast majority of which have been analyzed chemically and from this wealth of material valuable deductions have been drawn. It was shown, for instance, that uric acid or its salts formed the nucleus of calculus formation in eleven-fifteenths of all specimens; that ureate of ammonia in its pure state is peculiar to early life, being seldom, if ever, found after puberty. The accuracy of the general law, laid down by Dr. Marcet, that the phosphatic diathesis is never succeeded by any other, is fully borne out by the examination of this collection, and once the phosphate of lime, ammonia and magnesia (often mixed) starts to form they are rarely succeeded by other deposits. The collection shows no instance in which the phosphates form the nucleus of a calculus. That uric acid calculi can undergo partial solution while in the bladder is proven by several specimens; and the pure uric-acid calculus is the one that occasionally undergoes spontaneous fracture.

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*Read at a meeting of the Section of Medical History of the College of Physicians of Philadelphia, March 24, 1925.

Each calculus in the catalogue is accompanied by a brief history, a chemical analysis and the name of the donor, and I have picked out a few unique for history, operation or character of stone formation, hoping that they may interest you as they have me.

Repeatedly, we will find specimens removed and donated by the famous operators of their day, for it must be remembered that the field of surgery was limited and lithotomy represented one of the few major operations advised and voluntarily undertaken, and where accident or emergency played no part. The quaint English and the expressions used, often so descriptive, are likewise worthy of your attention.

C 7. A large and characteristic specimen of the mulberry calculus, having the following curious manuscript memorandum by Sir Hans Sloane:

> This stone was given me by Mr. Pearce, who assisted while it was cut out of the bladder of a sailor, 29 years of age, in St. Bartholomew's Hospital, in the year 1717, by Mr. Salter. He was a lusty, strong, hardy fellow. The pain in his bladder was not great until two days before he was cut, but during these it was very acute and probably the tubercles at the surface were formed during this time; indeed the whole seems not to have been long in formation. There is a nucleus or central body, about which the incrustations were successively formed; they are irregular, and as it were curled or undulated. The urine seems to have been in ebullition when the whole, and especially when the tubercles, were formed. None but a fellow so hardy could have borne such principles in him, abid the formation of such a stone, or indured the cutting of it out, all which yet he bore well, recovered, and went away in good health to sea.

Cc 51. A globular-shaped calculus having three projections composed of phosphate of magnesia and ammonia.

> Taken from the bladder of a young man who had long been laboring under symptoms of stone. The bladder was contracted, thick-walled and fleshy; its mucous surface was thick and corrugated, full of crypts, and large muscular bands stretched across its surface. The calculus was lodged in a deep excavated cupped ulcer in the front of the trigone vesicale just behind the urethra; and its three projections corresponded with the three openings of the bladder, viz. the urethra and the two ureters.

Presented by James Salter, Esq., 1864.

Here is an instance of success and true gratitude:

A 214. Section of a large uric calculus, "containing merely traces of earthy matter, chiefly oxalate of lime. It weighed when entire, six and a half ozs. troy." Extracted by operation from the bladder of a Hindoo, twenty-eight years of age, a Brahmin by caste, by George Coles, Esq.

> The patient suffered for many years from urinary symptoms of a most distressing character; these latterly so much increased as to render him incapable of bearing the motion of a horse, and unable to do any kind of work; his sleep was also much disturbed. The bladder was not diseased; the prostate was not enlarged or indurated. There was no great difficulty in extracting the stone. The patient had no bad symptoms after the operation; he recovered in one month and sixteen days, and walked from the Indus to Lahore, a distance of 240 miles, in order to see Mr. Coles a year after.

Presented and analyzed by Bransley B. Cooper, Esq.

You are curious as regards operative fees in those days? Here is one recorded:

A 264. A large uric-acid calculus, which at the present time and after division weighs two ounces seven drachms. "Cut from James Clitherow, of Boston House, 13th of August, 1680, then aged 62. Clitherow died Nov. 25th, 1682." The following curious statement of expenses attending the operation was taken from his books and sent with the stone: "To £150 paid by agreement to Monsieur Callot ye Frenchman for cutting me of the stone. To Apothecary, Surgeon, and Nurse that attended me £28 15s. 2d. For a pallet bed and ye furniture of it then used £6 17s. For charges of removing to and from London £1 10s." Presented by George Cooper, Esq., 1866. (Total $933.00.)

Encysted or diverticulated calculi were probably rarely recognized and often overlooked in those days before the *x*-ray, though the following graphic description leaves nothing to be asked:

B f 8. Half of a large calculus, the greater part of which consists of uric acid, deposited upon a small nucleus of urate of ammonia mixed with oxalate of lime. The calculus, when entire, weighed three ozs. and a quarter (Av.). Extracted, by the lateral operation, from a boy fourteen years of age, a patient in the Middlesex Hospital, by Mitchell Henry, Esq. The boy had suffered from symptoms of stone during two years; he quickly recovered.

Considerable difficulty was experienced in removing the stone, arising partly from its large size, and partly from the fact that it was adherent to the upper part of the bladder. This was shown by the fact that when the stone was drawn down by the forceps, and then suddenly let go, the rebound of the stone and of the bladder into their natural positions could be distinctly felt by the hand placed upon the abdomen; moreover it was only when the forceps was directed upwards, and to the right side, that the stone could be seized. Presented by Mitchell Henry, Esq., 1858.

Hernia of the bladder with calculus is found in the next specimen:

H 34. A fusible calculus which was contained in a portion of the bladder that protruded through the abdominal ring into the scrotum, and was removed during life by Mr. Percival Pott. The calculus is surrounded by the portion of the bladder which formed the cyst. The following history of the case has been abridged from Mr. Pott's "Chirurgical Works."[1]

A boy about six years old was seized with an acute pain about the region of the pubes: it lasted near an hour and a half, and suddenly ceasing he became perfectly easy. During the time his pain lasted he could not discharge a drop of water, though he endeavoured so to do, but as it ceased he pissed freely. In a few days after a small tumour was discovered, about the size of a pea, in the spermatic process just below the groin; it gave the child no pain, and therefore no notice was taken of it . . . When about thirteen years of age the boy was examined by Mr. Pott, who found the swelling to be perfectly equal as to its surface, indolent, and of a stony incompressible hardness; it was troublesome from its weight, but never occasioned pain in the back or loins: it had every appearance of being dependent from the spermatic process, which was larger than natural, although the cord had neither the feel nor the appearance of being diseased. As the tumour was now troublesome upon motion, and manifested a disposition to increase in size, it was resolved to remove it. An incision was therefore made through the skin, and cellular membrane, the whole length of the process and scrotum, when a firm white membranous bag or cyst was exposed, connected loosely with the cellular membrane, and which, on being traced upwards, became narrower, and was found to be dependent from, and continuous with, a membranous duct, about the breadth of the largest wheat-straw, or what it was more like to, a human ureter muscle. The testicle lay immediately behind the tumour, and was small, flat, and compressed. On dividing the duct immediately above the tumour, about four ounces of a clear fluid issued, and the mouth of the cyst expanding itself, disclosed a stone exactly resembling what is found in the human bladder. In order to be certain that the cyst was connected with the bladder, the boy was desired, after some time, to make water; when a large stream of urine flowing through the wound, instead of the urethra, put the matter beyond all doubt. The patient was dressed superficially; he had no bad symptoms, his urine came through the wound in his groin for about a fortnight, but as the wound healed it resumed its natural course; since which time he has remained free from complaint, except that the natural size of the bladder being lessened by the extirpation of a part, he is obliged to discharge his urine rather more frequently.

Presented by Henry Earle, Esq., 1818.

[1] Pott, P. Chirurgical Works. 1775, p. 789.

That symptoms of stone may abate over long periods is not generally conceded, yet here is one of thirty-three years' duration:

C 64. An oxalate of lime calculus, having an oval figure which weighs one ounce and a half. It is a very dark colour, and is highly tuberculated on its external surface. Extracted, by operation, from the bladder of a man forty-five years of age, a patient in Bucks Infirmary, by James H. Ceely, Esq. The man, when fifteen years of age, suffered from pain in the hypogastric region, extending along the urethra to the glans penis; during the succeeding twelve months, the pain was very violent at intervals, and was followed at each attack by the evacuation of bloody urine. Since that time he occasionally experienced pain in these situations when taking horse exercise, or during unusual exertion, but never to any great extent. With these exceptions, his general health, although delicate, had been good until three months before his admission to the Hospital, when he had an accession of symptoms similar to those already mentioned, but greatly aggravated, the urine, in addition to blood, containing gravel. The patient was discharged perfectly well one month after the operation. Presented by James H. Ceely, Esq., 1865.

I have mentioned that speed was essential to success in operating in these pre-anesthetic days, and it is remarkable to what extent it was developed.

A 215. A large uric acid calculus, of a flattened oval figure, which weighed four ozs. troy. Extracted in two minutes from the bladder of an Indian artisan, aged forty, by Thos. Atchison, Esq. The patient recovered. A simple incision was made; the urine passed through the urethra on the fifth day after the operation.

Presented by Thos. Atchison, Esq., 1857.

Cheselden is said to have done a lateral lithotomy in twenty-four seconds and seldom took longer than one minute for a single stone: in proof of which we find:

A 110. An undivided uric acid calculus, finely exhibiting the tuberculated exterior; it is inclosed in a box, on the lid of which is engraved: "This stone was extracted by William Cheselden, Esq., from William Nightingall, on April 20th, 1737; its weight six ounces and a half, and in circumference nine inches; the operation was effected in half a minute."

Such careful safe-keeping was not unique in family archives and the surgeon's efforts were often considered worthy of careful record and preservation.

Thus we find the following specimen also:

B d 3. A small oval calculus, contained in an oval silver box, with the family arms engraved on the lid, and the following inscription on the outside: "Deliverance was sent from God to Francis Godman, the 26th September 1687, in the 7th year and 10th day of his age." Presented by F. G. Capell, Esq., 1823.

There are numerous unique and rare specimens, and I will present some without comment:

F 7. Calculus matter lining the interior of a "sac connected with the bladder of King George IV." Museum of Sir Astley Cooper, Bart.

One case of pilimiction is recorded with calculus formation:

H a 16. Earthy phosphates mixed with and apparently deposited upon hairs from the bladder of a woman. Presented by Joseph Hodgson, Esq., 1866.

A 75. Presents a large calculus, consisting of uric acid with a very thin layer of the mixed phosphates on its exterior: this calculus was accompanied by the following history in the Sloanian Catalogue, although from its size it is scarcely credible, being two inches, and an inch and a half, in its two short axes, and two inches and a half, in its long axis. "A stone voided by a woman without being cut; given me by Dr. Massey." British Museum, 1809.

A c 27. Numerous small calculi, which with about two hundred others were removed from between the prepuce and glans penis of a very old man. The patient had congenital phimosis, the orifice of the prepuce scarcely admitting the introduction of a common probe. From the presence of the calculi the prepuce was distended to the size of a pullet's egg, and retention of urine was finally produced. Presented by J. P. Vincent, Esq., 1842.

That the advice of the surgically great was not always what we would today consider wise, is recorded in specimen H49:

H 49. Several small calculi, presented by J. P. Vincent, Esq., with the following history-1843.

Frederick Rule, aged 23 years, by occupation a boot-maker, and who has generally had good health, was admitted into St. Bartholomew's Hospital under my care, Feb. 20, 1843, stating that he was suffering from incontinence of urine. On examining him, I found that to stop the constant flow of the urine, he was wearing a brass yoke; and that there was a tumour the size of a goose-egg in the perineal space just behind the scrotum. On handling this tumour, it gave the sensation of a collection of stones in a bag. The yoke was applied just behind the glans. On examining the urethra I found that a very narrow stricture existed about two inches from the orifice, below the usual situation in which the yoke was worn. Only the finest catgut could be passed through this stricture, and this came in contact with stones. The patient gave the following account: About ten years ago he was kicked by a horse, when the parts about the pubis and the body of the penis were severely bruised; leeches, etc., were applied and he was unable to void his urine for forty-eight hours; when it began to flow, it was preceded by a coagulum of the figure of the urethra. About three weeks after this he had difficulty in making water, and afterwards it only dribbled away when the bladder was much distended. This incontinence of urine continued; and he was taken to Sir A. Cooper about twelve months after the accident from the horse, who recommended the yoke, which he was continued to wear up until this time. Six years ago he had bleeding from the urethra for several days, and he then perceived a swelling in the situation of the present tumour. This enlargement gradually increased to its present size; the incontinence continues, and he has now pain in the tumour when he is in exercise, etc. Feb. 25th, I made an incision into the most prominent part of the tumour, and gave exit to 146 calculi of various figures and sizes, the largest being about the size of a horse-bean. After the pouch had been emptied there were several in that part of the urethra next the bladder, which were removed, and two of the number came away the next day. The cyst consisted of a dense and tough membrane, like parchment. It communicated with the urethra its whole length and graduated into it, so as to offer no abrupt nor partial connection with it, and appearing to me to be formed by its dilatation. After the operation the patient retained his urine, passing it voluntarily through the wound.

Had I been asked the question, I believe I would have said that the knowledge and appreciation of calculus formation in the prostate gland was a recent development, and probably due to *x*-ray investigation. Not so. Here are three examples of several similar ones:

F 9. Numerous small calculi "from the prostate gland." Phosphate with a small quantity of carbonate of lime. Museum of Sir Astley Cooper, Bart.

H 55. A prostatic calculus removed by incision of the perineum from an agricultural laborer twenty-six years of age, by T. Herbert Barker, M.B. The man suffered from incontinence of urine since he was five years old; six days prior to the stone being removed a fistulous passage formed in the urethra, from which pus and a considerable quantity of urine escaped. When first examined he was laboring under complete retention of urine, and complained of considerable pain in the urethra and perineum; the penis was edematous, the perineum slightly swelled, and deep-seated hardness could be felt in its center, which gave the feeling of crepitation when moved from side to side. The presence of a stone could not be detected when a probe was passed into the fistulous opening. The patient recovered, and went to his work eight weeks after the operation; but neither at that time, nor subsequently, could he retain more than an ounce of urine in his bladder. This calculus is made up of 29 concretions closely adapted to each other by articulating surfaces.

H 13. One large and three small calculi, having articulating surfaces; these calculi were taken from the prostate gland, which was converted into a cyst: They consist of the mixed phosphates with a little urate of ammonia and carbonate of lime, and weigh 575 grains. One of these calculi protruded about one-tenth of an inch into the cavity of the bladder, through an ulcerated opening anterior to the natural opening of the urethra. That portion of the bladder and urethra which contained the calculi is preserved in spirit. Presented by Wm. Lawrence, Esq., 1817.

The old lithotomists knew nothing of the types of calculi, thought nothing of the case histories, and added nothing to the knowledge of the etiology of calculus formation, but spent their time fighting over various and sundry methods, steps and tools of the operation. Hence we hear of the classical incision of Celsus, the lateral operation of Franco, the bilateral of Dupuytren, the perirectal of Nelaton, the mediobilateral of Civiale and the quadrilateral of Vidal de Cassis. There was the "*grand appareil*" and the "*petit appareil*" merely a difference in the number of instruments the operator invented and used. What was, however, wanting in knowledge was supplied abundantly by speculation, for if we consult the works of medicine previous to the researches of Scheele in 1776, we find them "filled with conjectures, which, however ingenious, were for the most part erroneous, generally absurd, and always founded on mere speculation."

As you know, Peter Franco, Surgeon of Turrière, France, was the first to perform suprapubic lithotomy in 1560, operating upon a child two years of age. Rosset, twenty years afterwards, advised it, but not until three centuries after did John Douglas of England revive it and did it receive surgical recognition. The following is of interest:

B i 17. "Removed from the bladder of a boy 17 years of age, at St. George's Hospital, May 26, 1820. This was the first case of removal by the high operation without wounding the perineum; the boy soon recovered." Presented by Sir E. Home, with the foregoing memorandum, 1820.

Likewise early attempts at lithotrity are of interest, and one of these procedures perfected in the hands of Civiale consisted of grasping the stone by means of a three-fingered "trilabe" and then with a centered drill the stone was perforated in an effort to effect either its rupture or to create a passage for urine.

B g 3. A calculus which was perforated by Mr. Costello at Bristol. The patient afterwards came to London and was admitted into St. Bartholomew's Hospital, where he died, previous to any further operation being attempted. The perforation remains, except that it is closed at both ends by the subsequent deposits.

Sir Everard Home mentions in his "Diseases of the Prostate," the unique case of Colonel Martin, who attempted and is supposed to have succeeded in crushing a stone in his own bladder by means of a bougie with a serrated extremity.

H a 14. Portions of a brass pin which formed the nucleus of a urinary calculus, and to one of which the phosphates still adhere. The following particulars of the case were communicated by Anthony White, Esq.: Robert Cole, twenty-two years of age, had suffered from pains in the loins, bladder, and urethra for the last two years, during which time he had been treated for a supposed disease of the kidney. His urine was frequently tinged with blood, and he carried his body bent forwards, the upright position always producing an exaggeration of his symptoms. On examining the bladder with a sound, a large stone was felt, which was readily seized by the Lithotrity forceps, and measured twelve lines on the scale of the instrument. The stone was easily broken down by gentle blows with the hammer, but the smaller branch of the instrument could not by any means be brought in contact with the other branch, by nearly three lines and a half. On attempting to open the instrument, its branches were found to be so firmly fixed, that they resisted the most powerful efforts to separate them. The instrument was therefore withdrawn, in effecting which, however, the greatest difficulty was experienced; when the curved portion of the instrument had arrived at the neck of the bladder it remained fixed for a considerable time, but suddenly yielding, came with a violent jerk into the urethra, through which it was with difficulty drawn. The instrument being examined, its branches were found firmly wedged by two portions of the pin, which had been cut across. That portion of the pin on which the calculous matter still remains, was voided along with the urine on the following day. The patient stated that he had swallowed a pin five years before, but that he suffered no inconvenience from it until within the last two years, when he was attacked with pain in making water, etc. Notwithstanding the force which was required to withdraw the instrument, the patient did not evince any increase of pain during the operation, and he completely recovered without any bad symptoms. Presented by Arthur White, Esq., 1842.

Nor was the "two-stage" operation unappreciated by the surgeons of the past century:

C 15. A compact oxalate of lime or mulberry calculus, presented by James Briggs, Esq., with the following history:

> Extracted from the bladder of a man aged 24 years, by trade a printer, at a second operation, affording one among others of the success of the method termed by the French "Taille en deux temps." In attempting to extract the stone during the first operation, it slipped from the forceps; and though it could be felt, it could not afterwards be laid hold of, in consequence of being apparently lodged in a pouch of the bladder. The operation was completed eight days afterwards, the stone being found in contact with the opening made into the bladder. It was necessary to enlarge the wound slightly, and its extraction was difficult; yet no ill consequence followed, either in the interval between the two operations or afterwards, and the recovery was more rapid than usual.

There are many calculi recorded that have particular interest because of their rarity and numerous others whose operations presented difficulties and unusual skill, but I will conclude with the citation of two whose quaint histories and graphic descriptions present very clearly the trials of the surgeons who worked in the days before modern advancements, and in themselves and their patients so ably portray their period in surgery.

We have all heard (and unfortunately still do hear) of the exploits of the unscrupulous claiming to be able to dissolve stone. Frequent references are found in the catalogue to the much-heralded values of "Friar's Balsam," "Constitution Water," and so forth; several mention the celebrated Mrs. Joanna Stephens, who finally succeeded in holding up Parliament itself for the neat sum of $30,000 before divulging the secret of her worthless remedy. The ingredients of this remedy were published in the *London Gazette* of June 19, 1739, and turned out to be a mixture of egg shells, garden snails, swines' cresses, soap and such vegetable ingredients as burdock seeds, hips and haws. In each one of her certified "cures" the stone was found in the bladder after death. But here let me present one of her disciples and let him tell his own story:

A 184. A small flat oval calculus taken after death from the bladder of William Hay, Esq., who took three ounces of Mrs. Stephens' medicine every day during five years, and for a considerable time afterwards a quantity of Castile soap, and also lime-water. Experience has fully confirmed the accuracy of Dr. Whytt's concluding remark, "that Mrs. Stephens' medicines, or soap and lime water, may give relief to patients, and make them pass through life, even although they have little effect in dissolving the stone." Mr. Hay continued taking his remedy to the last day of his life; he died of apoplexy in July 1775. By his own desire his body was opened, and the calculus contained in the bladder was placed in Sir Hans Sloane's collection, from which it was transferred to the College by Sir Joseph Banks. Mr. Hay published a pamphlet, called an "Essay on Deformity," at the end of which is a minute history of his own case and his opinion as to the efficacy of Mrs. Stephens' medicines, from which account the following has been taken:

> For many years red sand constantly came from me without pain or inconvenience. About nine years ago I began to be uneasy, and before twelve months had passed was so much out of order that I could no longer ride; the motion of a coach grew insupportable, and that of a chair or walking was generally attended with bloody water. I took Mrs. Stephens' medicines in the solid form, three ounces a day, for about five years, when I changed it for the same quantity of Castile soap, which about a year since I have reduced to two ounces and lately to one ounce with about a pint of lime-water mixed with milk, being willing to regain my liberty as far as is consistent with ease and safety. This regimen I have incessantly pursued, except some few days that I have purposely omitted it to observe the consequence of such omission. Whilst I pursue this regimen, I never discharge red sand, whenever I omit it for a few days I constantly do; by a steady perseverance in it my particular complaint has been gradually diminished and my health in general improved. I believe I could now ride, though I have not tried.

I seldom feel any uneasiness in a coach, and when I do it is inconsiderable, though sometimes, though very rarely, it is attended with bloody water, and the motion of a chair or walking does not affect me. In short, I have exchanged pain for ease, and misery for comfort; and had it not been for this medicine, I should not have been alive to tell my story.

The calculus is mounted between glasses in a gold frame, on which is engraved: "this stone weighs 99 grains," and this is enclosed in a gold box. It was also accompanied by a manuscript on vellum in a gold-mounted shagreen case. British Museum.

The largest stone in the collection is accompanied by the following unusual history:

H 2. Calculus taken after death from the bladder of Sir Walter Ogilvie, Bart. It weighs forty-four ounces troy, and measures sixteen inches around its long axis, and fourteen inches around its short axis. This calculus was examined by Dr. Powell, and found to consist of the triple phosphate of ammonia and magnesia with phosphate of lime and a large quantity of animal matter. An account of this enormous, and very characteristic specimen of the Fusible Calculus is given by Sir James Earle,[2] from which the following history has been abridged:

> Sir Walter Ogilvie, Bart., of Dundee, an officer in the regiment of Scotch Greys, at the age of twenty-three, active and healthy, was crossing the ferry at Leith when he received a blow on his back from the boom of the vessel, which paralyzed the pelvis and lower extremities. During two months he was obliged to have his water drawn off; for fourteen months he remained in bed, in a horizontal posture; and though he recovered the use of his bladder and limbs sufficiently to walk across the room with the help of crutches, and also to ride, when placed on a low easy horse, his health continued many years in a weak and precarious state, while the limbs acquired little additional strength or power. About twenty years after the accident, perceiving symptoms of stone in the bladder, he was examined by Mr. Benjamin Bell of Edinburgh, and stone was felt, which was judged to have attained a considerable size; the operation of extraction was then recommended, but was postponed from time to time, though his health declined and the irritation and pains in his bladder gradually increased. Sir Walter continued to endure this state of existence twenty-eight years from the time of the accident, when he became unable to make water in an erect position: this inconvenience increased to such a degree that latterly he could make none without standing almost on his head, so as to cause the upper part of his bladder to become the lower, and this he was obliged to do frequently, sometimes every ten minutes, as the quantity voided each time was less than the measure of a wine-glass, and when he used exercise, it was tinged with blood.
>
> These symptoms continued to increase in severity until the spasms and fits of pain from the urgent desire to void urine became so frequent and violent, and rendered his life so completely miserable, that he determined if possible, to have the stone extracted, and for that purpose came to London and placed himself under the care of Sir James Earle, it being then thirty years from the time of the accident. At this period, the stone could be felt above the os pubis, forming a large prominent tumour, and on attempting to pass a sound, the instrument struck a solid mass which prevented its entering the bladder. Mr. Cline being called into consultation, it was determined that an attempt should be made to extract the stone by the lateral operation; in the hope that the calculus would be found sufficiently soft to admit of its being broken down, and thus taken away; its magnitude precluding any idea of its being removed in an entire state.
>
> Sir Walter being made perfectly aware of the difficulties to be apprehended in the extraction of the stone, and also of the uncertainty of the result, determined to submit to the operation, which Mr. Cline was requested to perform. The staff could be passed in no further than the neck of the bladder; the division of the urethra and prostate gland was made with the scalpel and probe-pointed bistoury: when this was accomplished, it was found impossible to introduce any kind of forceps; but on pressing hard with the finger, part of the stone felt soft, gave way, and made some room for the forceps, which brought away several portions, and with the assistance of a scoop as much stone was extracted as would have filled a large tea-cup; but the great mass beyond what the finger could reach on either side still remained hard and impenetrable, and after repeated trials with forceps of different kinds, and of the strongest powers, it was found impossible further to reduce the size of it, or take it away. The operation, which was necessarily protracted, was borne with great firmness; but the patient becoming much exhausted, it was judged right to relinquish any further endeavors to extract the stone. No hemorrhage ensued, he became calm and composed, and passed a tolerably good night; the next day he complained only of the same kind of spasms and frequent pressing desire to void urine that he had

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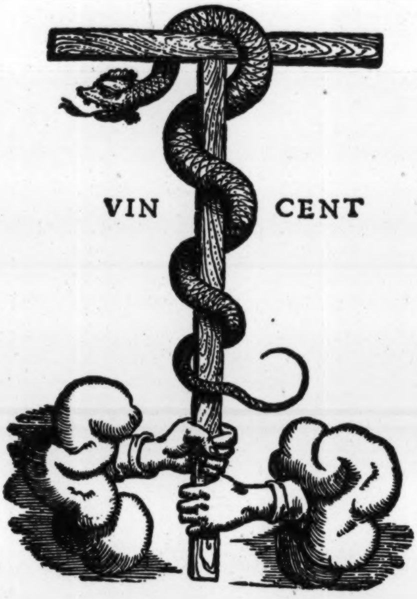
[2] Earle, J. *Trans. Roy. Soc.*, Lond., 1809, p. 303.

been accustomed to feel, although they were not much more acute. On the third day from the operation peritonitis took place, which was subdued by bleeding and fomentation. From this time he appeared to improve in health and strength; his rest was, however, continually broken by repeated spasms, which kept him in a constant state of irritation, obliging him to violent efforts in resisting them, and to get instantly on his knees with his head low in the bed, to enable him to expel the urine, one spasm frequently succeeding before the former had well subsided. Towards the eighth day he was visibly growing weaker; his pulse smaller and quicker; his little inclination for food became less and he was with difficulty prevailed on to take any; some cordial medicines however revived him, but on the following day he grew impatient, feverish and restless, and on the tenth day after the operation, desiring not to be teased to take anything more, he covered himself completely with the bed-clothes, and quietly resigned his most singularly miserable existence.

Presented by Sir James Earle, 1808.



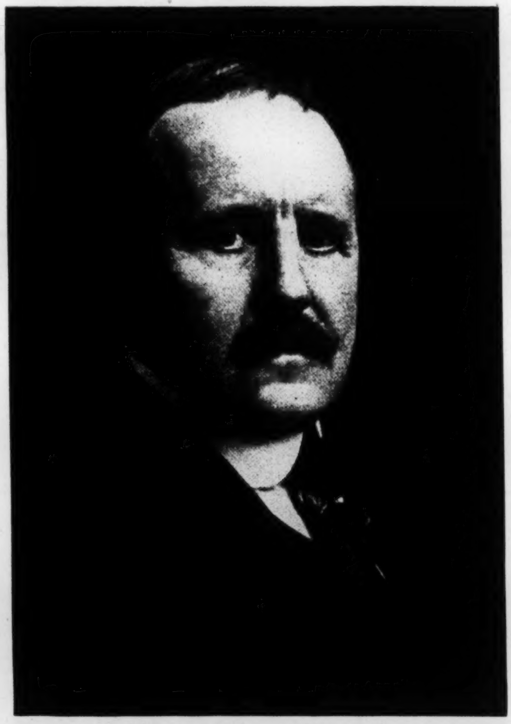
[Reproduction of an early nineteenth century headband.]

EDITORIALS

WILLIAM A. LOCY [1857–1924]

IN MEMORIAM

William Albert Locy, professor of zoology in the Northwestern University and widely known to students of medical history through his writings on the history of biology, died on October 9, 1924. He was born in Troy, N. Y. on September 14, 1857 and was a descendant of Cornelis Loyse, who emigrated from Holland and settled in New Amsterdam in 1651. He was educated at the University of Michigan, where he received his Master of Science degree in 1884, and was subsequently fellow in biology at Harvard (1884–5), and did further graduate work at the University of Berlin (1891) and the University of Chicago (1894–5), where he received his Ph.D. in 1895. He spent part of 1902–3 in special investigations at the Zoological Station of Naples and held in succession the chairs of biology (1887–9) and animal morphology (1889–96) in Lake Forest University, of physiology in Rush Medical College (1891) and of zoology in the Northwestern University (1896–1924). His original investigations in comparative embryology are many, and include important findings in development of the vertebrate head, the pineal eye, the accessory optic vesicles, the nervus terminalis (accessory cranial nerve) in Selachians, the metameric segmentation of the neural axis, the aortic arches in birds and mammals and the primary segments of the vertebrate brain.



William A. Locy (1857–1924).

On June 26, 1883, Professor Locy married Miss Ellen Eastman, daughter of Dr. Joseph Eastman of Flint, Mich., having three children, of whom Lieut. Francis E. Locy, of the Medical Department, U. S. Navy, won the Navy Cross for his record in the late war.

My friendship with Prof. William A. Locy goes back to the summer of 1910, when I first met him in the Surgeon-General's Library. It was one of those arid Washington summers that drive the fortunate to the mountains or the seashore. The air was surcharged with dust and heat-waves from the asphalt, and the shrill vibration of insects in the trees was like the grasshopper in Scripture, a burden to the flesh. Professor Locy had come to Washington to consult the now well-known monographs of Sudhoff on the early history of graphic anatomy, in connection with the preparation of his own historical study of anatomical illustration. I recall the compact sturdy figure, the Netherlandish twinkle in the black eyes, and the modest, quiet, withal dignified allure which betokens the serious student of science, the scholar and the gentleman. With the unbeatable persistency of his race, he stuck manfully to his guns through that long hot summer and the resulting essay was signalized by Sudhoff as the best piece of American work of the kind and was the first American publication to call attention to Sudhoff's own investigations in this field, hitherto unknown in this country. The amount of patient, careful research which went to the making of that unpretentious yet solid essay is highly characteristic of Locy. The outline of the history of biology,[1] now widely known as a standard source book, has again that inevitable unpretentiousness of statement which is proverbially the seal of truth. Each sentence is of the utmost simplicity, but behind every sentence stands the personality and sign-manual of that very honest gentleman, William A. Locy. As a source of information, the book is therefore absolutely reliable and authentic. It has been translated into German. Are merely trivial books on the history of science ever translated into German? *Simplex sigillum veri*. I recall vividly the keen, almost childlike delight which shone out of Locy's eyes when he told me of his personal investigations of Malpighi, Swammerdam and Leeuwenhoek, and how he had held the Swammerdam manuscripts and the Leeuwenhoek microscope in his hands. It was natural and inevitable that he should follow the travel-method of Sudhoff spontaneously and of his own motion, going straight to the authentic sources of knowledge, in whatever city and however distantly located. In preparing my own history of medicine, I found "Biology and Its Makers," like Sterling's "Apostles of Physiology," one of the most illuminating and inspiring books I have had the good fortune to know. No one can realize how much quiet, persistent work is implicit in the utterly simple paragraphs and pages which Locy has given us about Swammerdam or von Baer or Balfour or Kovalevsky. Locy's posthumous work on "The Growth of Biology," now in prospect of publication, is even more exhaustive in scope, the final fruition of a lifetime of intensive labor. As the ultimate publication of this work is seemingly dependent upon the extent of advance subscription, I would earnestly urge every one seriously interested in the history of biology and physiology to do his bit thereby. If, as Lord Bacon said, every physician is, in some sort, "a debtor to his profession," then this simple transaction would be one good way to prove it. Locy's real life work lay in laboratory investigations in embryology and in the teaching of embryology and zoology. He was one of that brilliant pleiad of investigators associated with the name of Charles Otis Whitman and his foundation of the *Journal of Morphology* in 1877. His original researches establish, each of them, some important stage or fact in the forward progress of his science "from point to point." Of this phase of his work, competent experts will write or have written. He was one of our foremost university teachers and I have no doubt that a goodly number of his students will make their marks as "pupils of Locy." As one of the founders of the section of History of Science in the American Association for the Advancement of Science, he was its first chairman and, in every sense, a prime mover. In the tribute read by one of his pupils at the last meeting of this section (December 31, 1924), one sensed the inspiring teacher of large views and the affection which was his natural portion among his friends and pupils. In his capacity for friendship there was the same quality of quiet persistence which is apparent in his scientific and historical writings. Whenever we met, I felt that nothing in the world could disturb the even tenor of my pleasant relation with this quiet, humorous friend, one of my elders and betters. Locy was, in fact, like the genial, urbane, old-fashioned Americans described in the novels of Henry James, the kind who were supposed, in those days, to "go to Paris" when they died. Like many who are wrapped up in arduous investigations in the confines of human knowledge, he was somewhat slow, cautious and deliberate of speech, but in the "jazz age" of cocksureness and rapid-fire pyrotechnics, this may almost be esteemed a merit. In his case, it was assuredly the index of initial, fundamental sincerity, of a keen sense of the ridiculous, and of a set aversion to what is shallow, futile and superficial, specious, showy and void. The late war, like other wars, has produced a vast outcropping of cockiness and conceit everywhere, merging at the mathematical limit into a totally brutish disregard for the personal rights and private feelings of others. Even the history of science, as Sudhoff points out, may become a pretext for "throwing out the chest." Locy, like Darwin, Haeckel, Mendel, Leidy and other quiet workers in biological science, was miles and marine leagues above men of this secondary type, and bore

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[1] Locy, W. A. Biology and Its Makers. N. Y., 1908.

> Without abuse
> The grand old name of gentleman,
> Defamed by every charlatan,
> And soil'd with all ignoble use.

F. H. GARRISON.

A VIRGINIA ACT ON INOCULATION FOR SMALLPOX

Dr. W. W. Keen of Philadelphia has very kindly sent us for publication some of the Acts passed by the Assembly of Virginia during the eighteenth century concerning inoculation for smallpox. Dr. Keen obtained photostat copies of these Acts by courtesy of the Librarian of the Library of Congress.

VIRGINIA ACTS [1736–1794]

"A Collection of all such Acts of the General Assembly of Virginia, of a public, and permanent nature as are now in force." (Richmond, 1794) Pages 209, 210 and 211, Chapter CVI: "An Act to reduce into one, the several Acts for regulating the Inoculation of the Small-Pox within this Commonwealth." (Passed the 21st of December, 1792.)

In the SEVENTEENTH YEAR of the
COMMONWEALTH
CHAP. CVI

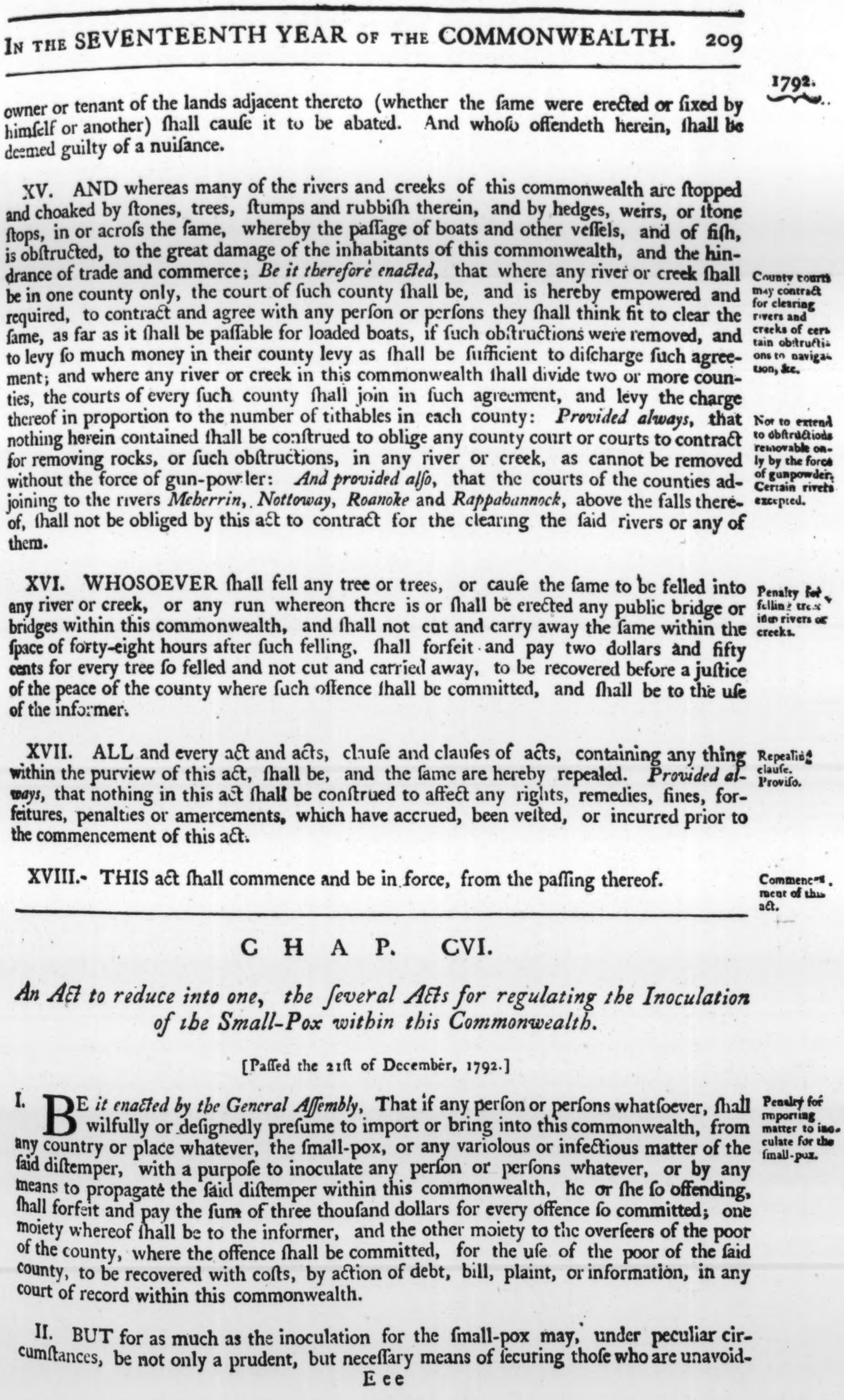
An Act to reduce into one, the several Acts for regulating the Inoculation of the Small-Pox within this Commonwealth.

[Passed the 21st of December, 1792.]

I. BE *it enacted by the General Assembly.* That if any person or persons whatsoever, shall wilfully or designedly presume to import or bring into this commonwealth, from any country or place whatever, the small-pox, or any variolous or infectious matter of the said distemper, with a purpose to inoculate any person or persons whatever, or by any means to propagate the said distemper within this commonwealth, he or she so offending, shall forfeit and pay the sum of three thousand dollars for every offence so committed; one moiety whereof shall be to the informer, and the other moiety to the overseers of the poor of the county, where the offence shall be committed, for the use of the poor of the said county, to be recovered with costs, by action of debt, bill, plaint, or information, in any court of record within this commonwealth. [Marginal note in line with "I. Be it enacted . . . " "Penalty for importing matter to inoculate for the small-pox."]

II. BUT for as much as the inoculation for the small-pox may, under peculiar circumstances, be not only a prudent, but necessary means of securing those who are unavoidably exposed to the danger of taking the distemper in the natural way, and for this reason it is judged proper to tolerate it, under reasonable restrictions and regulations. 1792.

III. BE *it therefore enacted.* That if any person shall think him or herself, his, or her family exposed to the immediate danger of catching the said distemper, such person may give notice thereof to the sheriff of any county, or to the mayor or chief magistrate of any city or cor-



IN THE SEVENTEENTH YEAR OF THE COMMONWEALTH. 209

1792.

owner or tenant of the lands adjacent thereto (whether the ſame were erected or fixed by himſelf or another) ſhall cauſe it to be abated. And whoſo offendeth herein, ſhall be deemed guilty of a nuiſance.

XV. AND whereas many of the rivers and creeks of this commonwealth are ſtopped and choaked by ſtones, trees, ſtumps and rubbiſh therein, and by hedges, weirs, or ſtone ſtops, in or acroſs the ſame, whereby the paſſage of boats and other veſſels, and of fiſh, is obſtructed, to the great damage of the inhabitants of this commonwealth, and the hindrance of trade and commerce; *Be it therefore enacted*, that where any river or creek ſhall be in one county only, the court of ſuch county ſhall be, and is hereby empowered and required, to contract and agree with any perſon or perſons they ſhall think fit to clear the ſame, as far as it ſhall be paſſable for loaded boats, if ſuch obſtructions were removed, and to levy ſo much money in their county levy as ſhall be ſufficient to diſcharge ſuch agreement; and where any river or creek in this commonwealth ſhall divide two or more counties, the courts of every ſuch county ſhall join in ſuch agreement, and levy the charge thereof in proportion to the number of tithables in each county: *Provided always*, that nothing herein contained ſhall be conſtrued to oblige any county court or courts to contract for removing rocks, or ſuch obſtructions, in any river or creek, as cannot be removed without the force of gun-powder: *And provided alſo*, that the courts of the counties adjoining to the rivers *Meherrin*, *Nottoway*, *Roanoke* and *Rappahannock*, above the falls thereof, ſhall not be obliged by this act to contract for the clearing the ſaid rivers or any of them.

County courts may contract for clearing rivers and creeks of certain obſtructions to navigation, &c.

Not to extend to obſtructions removable only by the force of gunpowder. Certain rivers excepted.

XVI. WHOSOEVER ſhall fell any tree or trees, or cauſe the ſame to be felled into any river or creek, or any run whereon there is or ſhall be erected any public bridge or bridges within this commonwealth, and ſhall not cut and carry away the ſame within the ſpace of forty-eight hours after ſuch felling, ſhall forfeit and pay two dollars and fifty cents for every tree ſo felled and not cut and carried away, to be recovered before a juſtice of the peace of the county where ſuch offence ſhall be committed, and ſhall be to the uſe of the informer.

Penalty for felling trees into rivers or creeks.

XVII. ALL and every act and acts, clauſe and clauſes of acts, containing any thing within the purview of this act, ſhall be, and the ſame are hereby repealed. *Provided always*, that nothing in this act ſhall be conſtrued to affect any rights, remedies, fines, forfeitures, penalties or amercements, which have accrued, been veſted, or incurred prior to the commencement of this act.

Repealing clauſe. Proviſo.

XVIII. THIS act ſhall commence and be in force, from the paſſing thereof.

Commencement of this act.

CHAP. CVI.

An Act to reduce into one, the ſeveral Acts for regulating the Inoculation of the Small-Pox within this Commonwealth.

[Paſſed the 21ſt of December, 1792.]

I. BE *it enacted by the General Aſſembly*, That if any perſon or perſons whatſoever, ſhall wilfully or deſignedly preſume to import or bring into this commonwealth, from any country or place whatever, the ſmall-pox, or any variolous or infectious matter of the ſaid diſtemper, with a purpoſe to inoculate any perſon or perſons whatever, or by any means to propagate the ſaid diſtemper within this commonwealth, he or ſhe ſo offending, ſhall forfeit and pay the ſum of three thouſand dollars for every offence ſo committed; one moiety whereof ſhall be to the informer, and the other moiety to the overſeers of the poor of the county, where the offence ſhall be committed, for the uſe of the poor of the ſaid county, to be recovered with coſts, by action of debt, bill, plaint, or information, in any court of record within this commonwealth.

Penalty for importing matter to inoculate for the ſmall-pox.

II. BUT for as much as the inoculation for the ſmall-pox may, under peculiar circumſtances, be not only a prudent, but neceſſary means of ſecuring thoſe who are unavoid-

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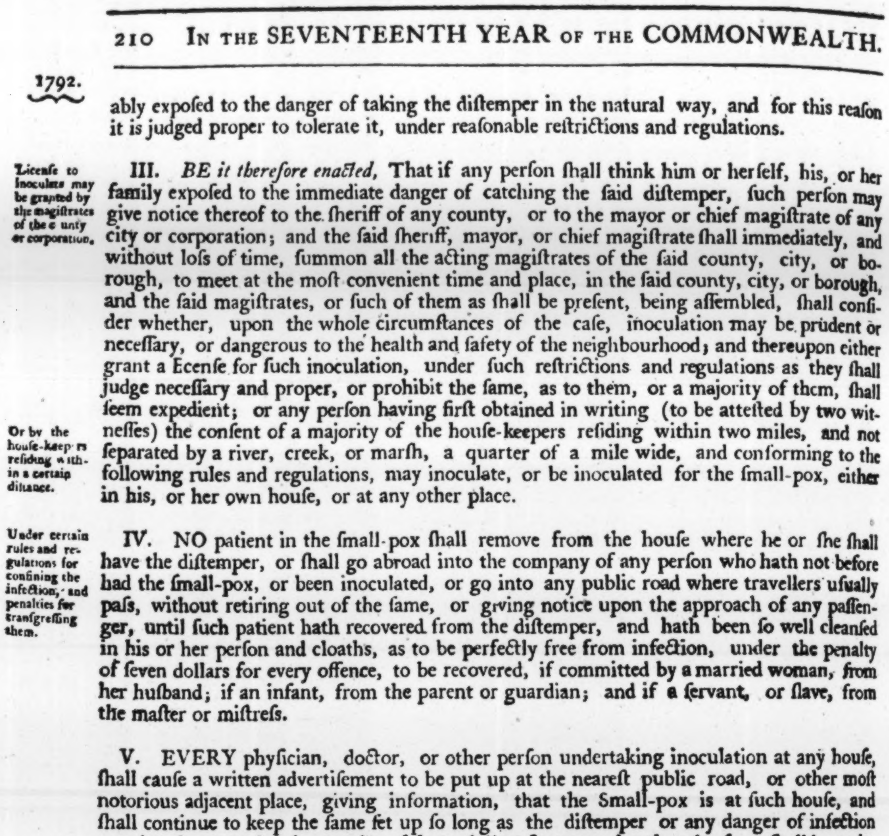
FIG. 1.

FIGS. 1, 2, 3. CHAPTER CVI OF THE ACT OF THE GENERAL ASSEMBLY OF VIRGINIA, CONTAINING REGULATIONS FOR SMALLPOX.



210 IN THE SEVENTEENTH YEAR OF THE COMMONWEALTH.

1792.

ably expoſed to the danger of taking the diſtemper in the natural way, and for this reaſon it is judged proper to tolerate it, under reaſonable reſtrictions and regulations.

Licenſe to inoculate may be granted by the magiſtrates of the county or corporation.

III. *BE it therefore enacted,* That if any perſon ſhall think him or herſelf, his, or her family expoſed to the immediate danger of catching the ſaid diſtemper, ſuch perſon may give notice thereof to the ſheriff of any county, or to the mayor or chief magiſtrate of any city or corporation; and the ſaid ſheriff, mayor, or chief magiſtrate ſhall immediately, and without loſs of time, ſummon all the acting magiſtrates of the ſaid county, city, or borough, to meet at the moſt convenient time and place, in the ſaid county, city, or borough, and the ſaid magiſtrates, or ſuch of them as ſhall be preſent, being aſſembled, ſhall conſider whether, upon the whole circumſtances of the caſe, inoculation may be prudent or neceſſary, or dangerous to the health and ſafety of the neighbourhood; and thereupon either grant a licenſe for ſuch inoculation, under ſuch reſtrictions and regulations as they ſhall judge neceſſary and proper, or prohibit the ſame, as to them, or a majority of them, ſhall ſeem expedient; or any perſon having firſt obtained in writing (to be atteſted by two witneſſes) the conſent of a majority of the houſe-keepers reſiding within two miles, and not ſeparated by a river, creek, or marſh, a quarter of a mile wide, and conforming to the following rules and regulations, may inoculate, or be inoculated for the ſmall-pox, either in his, or her own houſe, or at any other place.

Or by the houſe-keepers reſiding within a certain diſtance.

Under certain rules and regulations for confining the infection, and penalties for tranſgreſſing them.

IV. NO patient in the ſmall-pox ſhall remove from the houſe where he or ſhe ſhall have the diſtemper, or ſhall go abroad into the company of any perſon who hath not before had the ſmall-pox, or been inoculated, or go into any public road where travellers uſually paſs, without retiring out of the ſame, or giving notice upon the approach of any paſſenger, until ſuch patient hath recovered from the diſtemper, and hath been ſo well cleanſed in his or her perſon and cloaths, as to be perfectly free from infection, under the penalty of ſeven dollars for every offence, to be recovered, if committed by a married woman, from her huſband; if an infant, from the parent or guardian; and if a ſervant, or ſlave, from the maſter or miſtreſs.

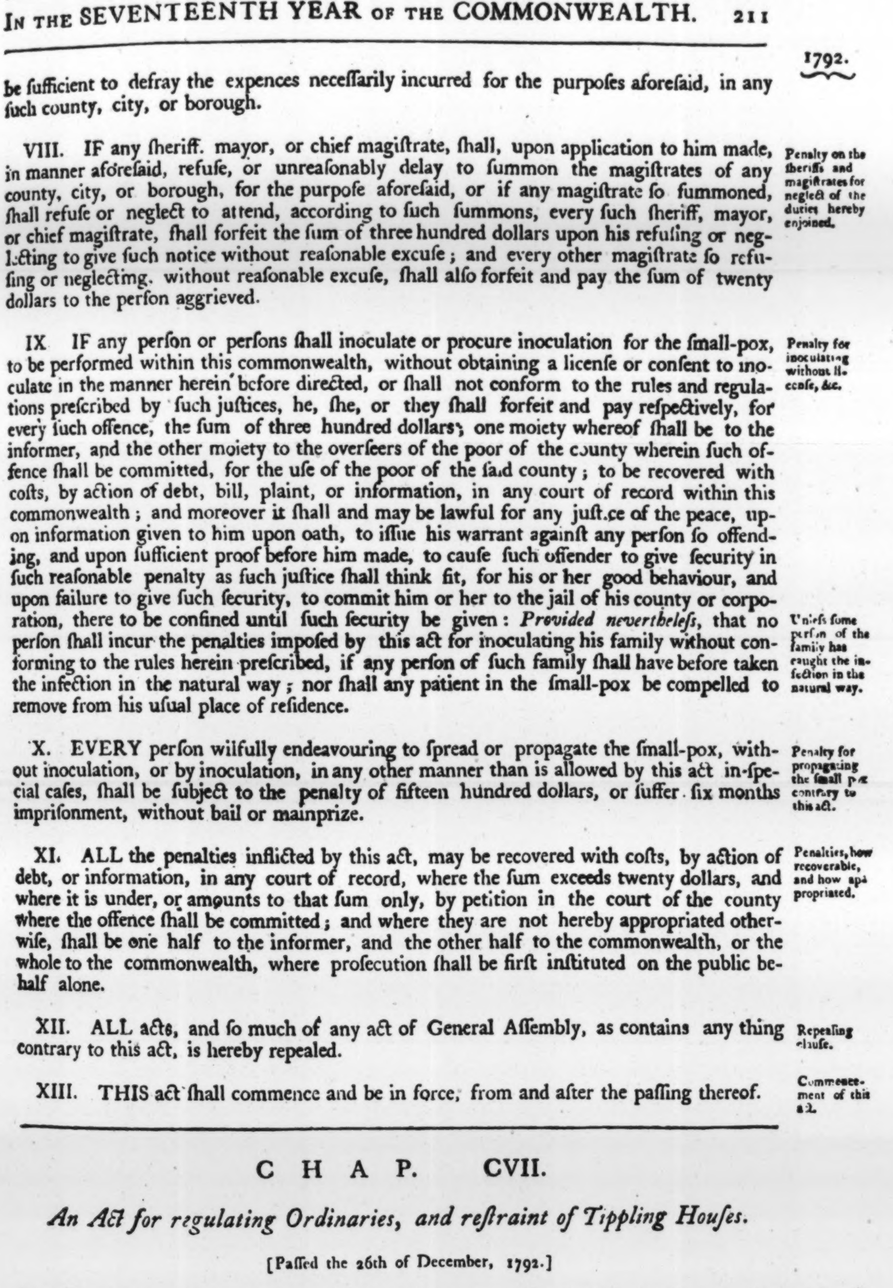
V. EVERY phyſician, doctor, or other perſon undertaking inoculation at any houſe, ſhall cauſe a written advertiſement to be put up at the neareſt public road, or other moſt notorious adjacent place, giving information, that the Small-pox is at ſuch houſe, and ſhall continue to keep the ſame ſet up ſo long as the diſtemper or any danger of infection remains there, under the penalty of ſeven dollars for every day that the ſame ſhall be omitted or neglected, to be paid by the phyſician or doctor, if the offence ſhall be committed when he is preſent, or by the maſter, miſtreſs, manager, or principal perſon of the family, reſpectively, if the offence is committed in the abſence of the phyſician or doctor. Every phyſician, doctor, or other perſon undertaking inoculation at any public place, or hoſpital, for the reception of patients, ſhall, before he diſcharges the patients, or ſuffers them to be removed from thence, take due care that their perſons and cloaths are ſufficiently cleanſed, and ſhall give ſuch patients, reſpectively, a certificate under his hand, that in his opinion they are free from all danger of ſpreading the infection, under the penalty of ten dollars for every offence; and every perſon wilfully giving a falſe certificate, ſhall be ſubject to the penalty of thirty dollars.

VI. IF any perſon who hath not had the ſmall-pox, other than thoſe who have been, or intend to be inoculated, ſhall go into any houſe where the ſmall-pox then is, or intermix with the patients and return from thence, any juſtice of the peace for the county or corporation, on due proof thereof, may by warrant cauſe ſuch perſon to be conveyed to the next hoſpital where the ſmall-pox is, there to remain until he or ſhe ſhall have gone through the diſtemper, or until the phyſician or manager of the hoſpital ſhall certify that in his opinion ſuch perſon cannot take the ſame, and if ſuch perſon be not able to pay the neceſſary expences, the ſame ſhall be paid by the county.

Expences incurred in checking the diſtemper or carrying on inoculation, how to be defrayed.

VII. AND whereas checking the progreſs of the ſaid diſtemper, where it may accidentally break out, or the regulations which may be eſtabliſhed for carrying on inoculation, may be attended with ſome expenſe, it ſhall and may be lawful for the juſtices of every county, at the time of laying their levy, and for the mayor, recorder, aldermen, and common-council of any city or borough, at ſuch time as they ſhall judge moſt convenient, to levy on the tithable perſons in their ſaid county, city, or borough, ſo much money as will

FIG. 2.



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be ſufficient to defray the expences neceſſarily incurred for the purpoſes aforeſaid, in any ſuch county, city, or borough.

VIII. IF any ſheriff. mayor, or chief magiſtrate, ſhall, upon application to him made, in manner aforeſaid, refuſe, or unreaſonably delay to ſummon the magiſtrates of any county, city, or borough, for the purpoſe aforeſaid, or if any magiſtrate ſo ſummoned, ſhall refuſe or neglect to attend, according to ſuch ſummons, every ſuch ſheriff, mayor, or chief magiſtrate, ſhall forfeit the ſum of three hundred dollars upon his refuſing or neglecting to give ſuch notice without reaſonable excuſe; and every other magiſtrate ſo refuſing or neglecting. without reaſonable excuſe, ſhall alſo forfeit and pay the ſum of twenty dollars to the perſon aggrieved.

Penalty on the ſheriffs and magiſtrates for neglect of the duties hereby enjoined.

IX IF any perſon or perſons ſhall inoculate or procure inoculation for the ſmall-pox, to be performed within this commonwealth, without obtaining a licenſe or conſent to inoculate in the manner herein before directed, or ſhall not conform to the rules and regulations preſcribed by ſuch juſtices, he, ſhe, or they ſhall forfeit and pay reſpectively, for every ſuch offence, the ſum of three hundred dollars; one moiety whereof ſhall be to the informer, and the other moiety to the overſeers of the poor of the county wherein ſuch offence ſhall be committed, for the uſe of the poor of the ſaid county; to be recovered with coſts, by action of debt, bill, plaint, or information, in any court of record within this commonwealth; and moreover it ſhall and may be lawful for any juſtice of the peace, upon information given to him upon oath, to iſſue his warrant againſt any perſon ſo offending, and upon ſufficient proof before him made, to cauſe ſuch offender to give ſecurity in ſuch reaſonable penalty as ſuch juſtice ſhall think fit, for his or her good behaviour, and upon failure to give ſuch ſecurity, to commit him or her to the jail of his county or corporation, there to be confined until ſuch ſecurity be given: *Provided nevertheleſs*, that no perſon ſhall incur the penalties impoſed by this act for inoculating his family without conforming to the rules herein preſcribed, if any perſon of ſuch family ſhall have before taken the infection in the natural way; nor ſhall any patient in the ſmall-pox be compelled to remove from his uſual place of reſidence.

Penalty for inoculating without licenſe, &c.

Unleſs ſome perſon of the family has caught the infection in the natural way.

X. EVERY perſon wilfully endeavouring to ſpread or propagate the ſmall-pox, without inoculation, or by inoculation, in any other manner than is allowed by this act in ſpecial caſes, ſhall be ſubject to the penalty of fifteen hundred dollars, or ſuffer ſix months impriſonment, without bail or mainprize.

Penalty for propagating the ſmall pox contrary to this act.

XI. ALL the penalties inflicted by this act, may be recovered with coſts, by action of debt, or information, in any court of record, where the ſum exceeds twenty dollars, and where it is under, or amounts to that ſum only, by petition in the court of the county where the offence ſhall be committed; and where they are not hereby appropriated otherwiſe, ſhall be one half to the informer, and the other half to the commonwealth, or the whole to the commonwealth, where proſecution ſhall be firſt inſtituted on the public behalf alone.

Penalties, how recoverable, and how appropriated.

XII. ALL acts, and ſo much of any act of General Aſſembly, as contains any thing contrary to this act, is hereby repealed.

Repealing clauſe.

XIII. THIS act ſhall commence and be in force, from and after the paſſing thereof.

Commencement of this act.

C H A P. CVII.

An Act for regulating Ordinaries, and reſtraint of Tippling Houſes.

[Paſſed the 26th of December, 1792.]

I. BE *it enacted by the General Aſſembly*, That every perſon intending to ſet up or keep an ordinary, or houſe of public entertainment, ſhall firſt petition the court of that county wherein ſuch ordinary is intended to be, and obtain a licenſe for keeping the ſame; and the juſtices of the court to whom ſuch petition ſhall be exhibited, ſhall there-

Ordinary licenſes how to be obtained.

FIG. 3.

poration; and the said sheriff, mayor, or chief magistrate shall immediately, and without loss of time, summon all the acting magistrates of the said county, city, or borough, to meet at the most convenient time and place, in the said county, city, or borough, and the said magistrates, or such of them as shall be present, being assembled, shall consider whether, upon the whole circumstances of the case, inoculation may be prudent or necessary, or dangerous to the health and safety of the neighbourhood; and thereupon either grant a license for such inoculation, under such restrictions and regulations as they shall judge necessary and proper, or prohibit the same, as to them, or a majority of them, shall seem expedient; or any person having first obtained in writing (to be attested by two witnesses) the consent of a majority of the house-keepers residing within two miles, and not separated by a river, creek, or marsh, a quarter of a mile wide, and conforming to the following rules and regulations, may inoculate, or be inoculated for the small-pox, either in his, or her own house, or at any other place. [Marginal note in line with—"III. BE . . . " "License to inoculate may be granted by the magistrates of the county or corporation." Marginal note in line with "the consent of a majority of the housekeepers . . . " "Or by the house-keepers residing within a certain distance."]

IV. NO patient in the small-pox shall remove from the house where he or she shall have the distemper, or shall go abroad into the company of any person who hath not before had the small-pox, or been inoculated, or go into any public road where travellers usually pass, without retiring out of the same, or giving notice upon the approach of any passenger, until such patient hath recovered from the distemper, and hath been so well cleansed in his or her person and cloaths, as to be perfectly free from infection, under the penalty of seven dollars for every offence, to be recovered, if committed by a married woman, from her husband; if an infant, from the parent or guardian; and if a servant, or slave, from the master or mistress. [Marginal note in line with "IV NO . . ." "Under certain rules and regulations for confining the infection and penalties for transgressing them."]

V. EVERY physician, doctor, or other person undertaking inoculation at any house, shall cause a written advertisement to be put up at the nearest public road, or other most notorious adjacent place, giving information, that the Small-pox is at such house, and shall continue to keep the same set up so long as the distemper or any danger of infection remains there, under the penalty of seven dollars for every day that the same shall be omitted or neglected, to be paid by the physician or doctor, if the offence shall be committed when he is present, or by the master, mistress, manager, or principal person of the family, respectively, if the offence is committed in the absence of the physician or doctor. Every physician, doctor, or other person undertaking inoculation at any public place, or hospital, for the reception of patients, shall, before he discharges the patients, or suffers them to be removed from thence, take due care that their persons and cloaths are sufficiently cleansed, and shall give such patients, respectively, a certificate under his hand, that in his opinion they are free from all danger of spreading the infection, under the penalty of ten dollars for every offence; and every person wilfully giving a false certificate, shall be subject to the penalty of thirty dollars.

VI. IF any person who hath not had the small-pox, other than those who have been, or intend to be inoculated, shall go into any house where the small-pox then is, or intermix with the patients and return from thence, any justice of the peace for the county or corporation, on due proof thereof, may by warrant cause such person to be conveyed to the next hospital where the small-pox is, there to remain until he or she shall have gone through the distemper, or until the physician or manager of the hospital shall certify that in his opinion such person cannot take the same, and if such person be not able to pay the necessary expences, the same shall be paid by the county.

VII. AND whereas checking the progress of the said distemper, where it may accidentally break out, or the regulations which may be established for carrying on inoculation, may be attended with some expense, it shall and may be lawful for the justices of every county, at the time of laying their levy, and for the mayor, recorder, aldermen, and common-council of any city or borough, at such time as they shall judge most convenient, to levy on the tithable persons in their said county, city, or borough, so much money as will be sufficient to defray the expences necessarily incurred for the purposes aforesaid, in any such county, city, or borough.

VIII. IF any sheriff, mayor, or chief magistrate, shall, upon application to him made, in manner aforesaid, refuse, or unreasonably delay to summon the magistrates of any county, city, or borough, for the purpose aforesaid, or if any magistrate so summoned, shall refuse or neglect to attend, according to such summons, every such sheriff, mayor, or chief magistrate, shall forfeit the sum of three hundred dollars upon his refusing or neglecting to give such notice without reasonable excuse; and every other magistrate so refusing or neglecting, without reasonable excuse, shall also forfeit and pay the sum of twenty dollars to the person aggrieved. [Marginal note in line with "VIII. IF any sheriff, . . . " "Penalty on the sheriffs and magistrates for neglect of the duties hereby enjoined."]

IX. IF any person or persons shall inoculate or procure inoculation for the small-pox, to be performed within this commonwealth, without obtaining a license or consent to inoculate in the manner herein before directed, or shall not conform to the rules and regulations prescribed by such justices, he, she, or they shall forfeit and pay respectively, for every such offence, the sum of three hundred dollars; one moiety whereof shall be to the informer, and the other moiety to the overseers of the poor of the county wherein such offence shall be committed, for the use of the poor of the said county; to be recovered with costs, by action of debt, bill, plaint, or information, in any court of record within this commonwealth; and moreover it shall and may be lawful for any justice of the peace, upon information given to him upon oath, to issue his warrant against any person so offending, and upon sufficient proof before him made, to cause such offender to give security in such reasonable penalty as such justice shall think fit, for his or her good behaviour, and upon failure to give such security, to commit him or her to the jail of his county or corporation, there to be confined until such security be given: *Provided nevertheless*, that no person shall incur the penalties imposed by this act for inoculating his family without conforming to the rules herein prescribed, if any person of such family shall have before taken the infection in the natural way; nor shall any patient in the small-pox be compelled to remove from his usual place of residence. [Marginal note in line with "IX. IF any person . . ." "Penalty for inoculating without license, etc." Marginal note in line with "*Provided nevertheless*, . . . " "Unless some person of the family has caught the infection in the natural way."]

X. EVERY person wilfully endeavouring to spread or propagate the small-pox, without inoculation, or by inoculation, in any other manner than is allowed by this act in special cases, shall be subject to the penalty of fifteen hundred dollars, or suffer six months imprisonment, without bail or mainprize. [Marginal note in line with "X. EVERY . . . " "Penalty for propagating the small-pox contrary to this act."]

XI. ALL the penalties inflicted by this act, may be recovered with costs, by action of debt, or information, in any court of record, where the sum exceeds twenty dollars, and where it is under, or amounts to that sum only, by petition in the court of the county where the offence shall be committed; and where they are not hereby appropriated otherwise, shall be one half to the informer, and the other half to the commonwealth, or the whole to the commonwealth, where prosecution shall be first instituted on the public behalf alone. [Marginal note in line with "XI. ALL the penalties . . . " "Penalties, how recoverable, and how appropriated."]

XII. ALL acts, and so much of any act of General Assembly, as contains any thing contrary to this act, is hereby repealed. [Marginal note in line with "XII. ALL acts, and so . . . " "Repealing clause."]

XIII. THIS act shall commence and be in force, from and after the passing thereof. [Marginal note in line with "XIII. THIS act . . . " "Commencement of this act."]

THE FIFTH INTERNATIONAL CONGRESS OF THE HISTORY OF MEDICINE

The Fifth International Congress on the History of Medicine will be held in Geneva from July 20 to July 25, 1925. The officers for the Congress according to the official programme, which is printed in French, are as follows:

HONORARY COMMITTEE

Honorary President: Sir D'Arcy Power, K.B.E., London
Honorary Vice-Presidents:
Prof. P. Capparoni, Rome
Prof. D. Giordano, Venice
Dr. E. B. Krumbhaar, Philadelphia
Prof. Laignel-Lavastine, Paris
Prof. J. G. de Lint, Hague
Dr. A. Patry, Geneva
Dr. J. D. Rolleston, London
Dr. Charles Singer, London
C. J. S. Thompson, M.B.E., London
Dr. Tricot-Royer, Anvers
Honorary Members:
Prof. George Werner, Rector of the University of Geneva
Prof. J. Taillens, Rector of the University of Lausanne
Prof. H. Christian, Dean of the Faculty of Medicine of Geneva
M. Frédèric Gardy, Librarian of the University of Geneva
Prof. Eugène Pittard, of the University of Geneva
Prof. L. Ménètrier, of the Faculty of Medicine of Paris
Prof. E. Jeanselme, of the Faculty of Medicine of Paris
Dr. André Guisan, of Lausanne.

COMMITTEE OF ORGANIZATION

President: Dr. Charles Greene Cumston
Vice-Presidents: Dr. Ernest Wickersheimer
Prof. Andrea Corsini
Grand Secretaries: Dr. A. de Peyer
Dr. Emile Thomas
Treasurer: Dr. Edouard Schauenberg

A most interesting series of addresses has been arranged and some very pleasant social features will be provided. The last Congress was eminently successful and there is every reason to believe that this will be equally so.

DR. ROBERT FLETCHER

The accompanying picture (frontispiece) of the late Dr. Robert Fletcher, the famous librarian and collaborator with John S. Billings in founding the Index Catalogue of the Library of the Surgeon-General's Office and the Index Medicus, has been loaned to the ANNALS OF MEDICAL HISTORY by Col. Fielding H. Garrison. It is a crayon drawing by P. Rénouard, a French artist, who drew it when visiting Washington. Fletcher is supposed to be presiding at a meeting of the Anthropological Society, probably in the Art Gallery. The knavish drollery of the faces in the oil painting forming the background constitute a curious contrast to the serious expression worn by Dr. Fletcher.

BOOK REVIEWS

A Surgical Pilgrim's Progress, 1845–1925. Reminiscences of Lewis Stephen Pilcher. Philadelphia and London, J. B. Lippincott Company, 1925.

This autobiography is a notable accession to the numerous works of a similar character which have appeared in such profusion during the last few years. Its author, one of the foremost American surgeons of his time, has edited since its foundation the leading surgical journal published in the English language, and has by his lifelong devotion to the highest professional ideals done an incalculable service to the advance of surgery and medicine in the United States. Told with the modesty which is one of his most marked characteristics to those who know him, Dr. Pilcher's story of his pilgrimage, the difficulties which beset it and its successful accomplishment, is replete with interest to every medical man.

Coming of splendid English stock which migrated from Virginia to Ohio and then to Michigan, Lewis Stephen Pilcher was born on July 28, 1845. His father was a Methodist preacher and the son was brought up in the strictest tenets of that faith. In 1863 he received the degree of M.A. from the University of Michigan and began his medical studies in that institution only to be interrupted in a very short time by his enlistment as a hospital steward in the United States Army. In this capacity he served until the conclusion of the Civil War, when he resumed the study of medicine, graduating in 1866. After a short period of practice in a country settlement, combined with teaching in the district school, young Pilcher heard that he could secure a position as house surgeon in the Harper Hospital in Detroit, and unhesitatingly grasped the opportunity. Not satisfied with the experience he received there he next went to New York for post-graduate work, and while there passed the necessary examinations and was commissioned as an assistant surgeon in the United States Navy. The author's description of his career in the Navy is well worth reading not only from the medical point of view but from the vivid contrast presented between life in the Navy at that time when the period of sailing vessels was not yet wholly over and the present. Pilcher passed nearly two years in the waters of the South Atlantic and the Carribean Sea. Yellow fever was the chief enemy which he had to combat. While serving on the Penobscot in the harbor of Havana the sailing frigate Saratoga, used as a schoolship, came into the port and anchored near the shore. The other United States vessels in the harbor were anchored at some distance out from the land. After a few weeks yellow fever appeared on the Saratoga, the ship's surgeon died of it, and Dr. Pilcher was ordered to take his place. The vessel was ordered to proceed north to Maine, a recognized procedure in such emergencies being to get the infected ship into a colder climate as soon as possible. The Saratoga accordingly started north but the number of cases of yellow fever increased rapidly and her captain wisely decided to put into New York. There the vessel was placed in quarantine. Dr. Pilcher, worn out by his constant labors as the only medical officer on the ship, fell ill himself a few days after the arrival of the ship, but, it should be noted, not until after the arrival of others to take charge of his sick. There were thirty-seven cases among the ship's crew, of whom seventeen died, twelve of the deaths occurring after the men had been brought ashore.

In 1870 Dr. Pilcher passed his examinations for promotion to the rank of surgeon in the United States Navy and married Miss Martha S. Phillips. The autobiography contains many glowing tributes to the aid afforded by this charming and gifted woman to the "Pilgrim" throughout his "Progress." In 1920 Dr. and Mrs. Pilcher celebrated the fiftieth anniversary of their married life. After the birth of a son Dr. Pilcher decided to resign from the Navy and enter private practice. In 1872 he settled in Brooklyn and commenced his career as a surgeon and teacher. He taught anatomy at the Long Island College Hospital and gained valuable experience in its surgical dispensary. In 1882 he severed his connection with that institution and became one of the most active organizers of a new hospital, the Seney Methodist Episcopal Hospital. Dr. Pilcher was one of the chief factors in the successful establishment of this great institution. To it he gave many years of devoted work and he records the deep regret with which a divergence of views between himself and the management led to his resignation from it in 1907. Although he was consulting surgeon to several other hospitals and thus possessed the needful accommodation for private patients in his very large practice, Dr. Pilcher determined to establish a private hospital of his own and in 1910 he opened a splendidly equipped surgical institution with his two well-trained sons, Paul and James, as his associates. From the outset the enterprise was a great success. Each year a Year Book was published containing a full report of its surgical activities. Then in 1916 its work was brought to an abrupt close by a terrible calamity. Pilcher's eldest son, Paul Pilcher, a young man of the greatest brilliancy, already widely known for his professional attainments, was stricken with pneumonia and died in a few days. The younger brother, James, was at the time absent on duty with his regiment on the Mexican border, from whence he went to France during the Great War. The stricken Father realized with heroic stoicism that the loss of his two aides meant the end of his project for the further continuance of his work, and the work of the hospital was given up.

Dr. Pilcher still is, and may he long continue to be, the editor of the *Annals of Surgery*, the leading journal of surgery in the English language. The first issue of the Annals appeared in January, 1885, under the editorship of Dr Pilcher, and throughout the forty years of its existence he has been the pilot who has conducted it upon a constantly prosperous voyage. For many years it has been the channel through which the transactions of the leading surgical societies of the United States have been communicated to the medical world.

In addition to his labors as an editor Dr. Pilcher has himself contributed much original matter to medical literature. Among the most important of his papers were those in which he embodied his observations on tracheotomy in diphtheria. Pilcher as the result of an exhaustive research into the so-called "membranous croup" formulated the conclusion that this terribly mortal disease was really diphtheritic in character. Writing before the discovery of intubation by O'Dwyer and long before the introduction of antitoxin, his studies on the anatomy of the neck and the technique of tracheotomy were of the greatest value to the profession. Pilcher devoted many years to a study of the pathological anatomy of fractures of the wrist and wrote and lectured much upon them. His views were original and did much to alter the older conceptions of the subject. In 1917 he published a monograph on "Fractures of the Lower End of the Radius," bringing the entire matter up to date and showing how *x*-ray studies had served to confirm the views he had expressed prior to Roentgen's discovery.

Every man has or ought to have a hobby, the riding of which serves to sweeten his mind and keep him young. Dr. Pilcher is not exempt. He is a bibliophile of the first water. In 1918 he published in a goodly volume a bibliographical study of his own collection of the works of the old masters of medicine and of books on the history of medicine, and the autobiography shows a picture of his shelf of medical Elzevirs and of his Vesaliana. His bookplate has on it a picture of the Mondinus tablet from the wall of the portico of the church of San Vitale in Bologna, and one of his most charming essays tells how he procured permission from the civil authorities to have a plaster cast taken of the tablet, which he subsequently donated to the library of the County Medical Society in Brooklyn. As onetime president and always a most active member of the Charaka Club of New York he has contributed much charming matter to its "Transactions." In 1921 the loyal services of Dr. Pilcher to his country were acclaimed by his election as Commander-In-Chief of the Grand Army of the Republic. As such he was called upon to participate officially in a number of interesting celebrations of a national character and by his dignity, urbanity and eloquence made a profound impression on many large audiences.

It has not been possible to quote the many passages in which his book abounds wherein the author gives expression to a noble philosophy of life. The autobiography breathes throughout the sane and sound sentiments of one who has loved and labored for his fellowmen and now in a mellow and serene old age can gather with contentment the fruit of an upright and active life.

F. R. Packard, M.D.

LORD LISTER. By Sir Rickman John Godlee, Bt., K.C.V.O., M.S., F.R.C.S. Ed. 3, revised and reset throughout. Oxford, at the Clarendon Press, Oxford University Press, Humphrey Milford, 1924.

The biography of the founder of antiseptic surgery, by his nephew, Sir Rickman Godlee, has won the great success which was predicted for it on its first publication in 1917. The present is the third edition and presents but few additions or changes from those which have preceded it, a statement which should be regarded as a tribute to the skill, fullness and accuracy with which the work was originally written. In English medical literature this biography of Lord Lister ranks with that of Pasteur by Vallery Radot in French, and it is interesting that two great men whose labors were so closely associated in their ultimate results should have the good fortune to be commemorated by two such excellent biographies. As a rule the autobiographies as well as the biographies of medical men are sadly disappointing, but Sir Rickman Godlee has given a dramatic finish to the hard-working scientific life of the famous Quaker surgeon that makes it most thrilling to read and presents in startling colors the difficulties which he had to overcome in successfully establishing his great doctrine.

Joseph Lister came of sturdy Quaker stock. His father, Joseph Jackson Lister, while engaged in business as a wine merchant, achieved great distinction as a mathematician by his optical investigations, which led to the construction of the achromatic lens, one of the most important adjuncts to modern optical science. Even as a boy Joseph Lister manifested marked interest in and ability for the study of the natural sciences, and at an early age announced his intention to become a surgeon. The universities of Oxford and Cambridge being barred to him because of the religious tests which they imposed, he entered University College, London, and after receiving his degree of B.A. proceeded through its medical school, becoming M.B. and a Fellow of the Royal College of Surgeons in 1852. Even when a medical student he had found time to do some original research work, publishing in 1852 a paper on the muscular structure of the iris, confirming Kolleker's discovery and in addition proving that there are distinct muscles, a sphincter and a dilator, and another article on the involuntary muscles in the skin. After his graduation Lister went to Edinburgh for what was intended to be a short visit to the clinics of that medical center. There he met James Syme, then at the height of his brilliant career. The acquaintance ripened quickly into the closest friendship. Lister stayed on to work with Syme, and in 1855 settled down to practice in Edinburgh, and began his lectures on surgery there. In 1856 he married Syme's daughter and was elected assistant surgeon to the Edinburgh Infirmary. While actively engaged in clinical surgical work he still found time to work with his microscope and published some papers showing the results of his investigations into the phenomena of inflammation and blood coagulation. In 1860 Lister received the appointment of regius professor of surgery in the University of Glasgow, a great honor for so young a man.

It was while working at Glasgow that Lister first became profoundly interested in hospital diseases and the healing of wounds. Godlee gives some very interesting figures illustrating the difference in the number of operations and nature of the operative work in hospitals at that time and subsequent to Lister's great discovery. Of these the statistics given of St. Bartholomew's Hospital are the easiest to draw deductions from.

> At St. Bartholomew's Hospital, probably the largest hospital in London at the time, there were, in 1865, 397 surgical beds. The average annual number of operations during the preceding five years was 370, of which 78 were amputations. The number of surgical beds at the present time is rather less—390. In 1912 there were 3561 operations (including 311 gynaecological), of which only 25 were amputations.

As Godlee states abdominal surgery was hardly thought of. Practically only one operation was ever performed on the thorax, the opening of an empyema. The brain and spinal cord were practically never operated on except for an occasional trephining of the skull. Amputation was more frequently resorted to because attempts at conservative surgery were so generally disastrous. Erysipelas, pyemia, septicemia and hospital gangrene were terrible enemies that stalked through the surgical wards of the best-regulated hospitals and marred the work of the best surgeons. Surgeons talked of healing of wounds by "first or second intention," and of "laudable pus." Many substances were known under the name of "antiseptics" which prevented putrefaction. In 1863 Lemaire published a book extolling the use of carbolic acid as a preservative for food and anatomical preparations, and also its use in surgical dressings. In a second edition, published in 1865, he expresses his belief that putrefaction is due to germs. Lemaire's work was not called to Lister's attention until 1867 and therefore had no influence on his discoveries in antiseptics. In England many substances, including benzoin, glycerine, iodine and alcohol were used more or less empirically in the dressing of wounds. Drainage for pus was usually supposed to be provided for by the ligatures which were allowed to protrude from the wound, and by placing the sutures far apart. It is curious but undoubtedly true that Lister knew absolutely nothing of the work of Semmelweiss.

In 1865 Lister's attention was aroused by the work of Pasteur in putrefaction and fermentation and he at once realized the important bearing it might have on wound infection and suppuration. If putrefaction was due to fermentation, the result of the activities of microscopic beings borne in the air, the problem lay in purifying the air, thereby preventing access to the wound of these agents. In other words Lister had conceived the idea of asepsis. Unfortunately he himself in his writings used the term antiseptic as applied to his methods, thereby giving rise to subsequent cavillings. In 1863 he began a course of earnest experimentation with carbolic acid as the chief agent. His first publication on the subject appeared in the *Lancet* in 1867, with the title "On a New Method of Treating Compound Fractures, Abscess, Etc., with Observations on the Conditions of Suppuration." A bitter controversy immediately began. Sir James Y. Simpson was especially conspicuous for his opposition to Lister's views. He directed attention to Lemaire's book and insinuated that Lister had stolen his ideas from that source. However, many surgeons journeyed to Glasgow and on seeing the results obtained by Lister in his wards became convinced of the value of his method. Lister's next advance was to try and eliminate the necessity for bringing the ends of ligatures out through the wound. He did not have much success with silk ligatures but on changing to catgut he found that the ligature ends could be cut short and the wound tightly closed with comparative safety. This was a tremendous advance in the perfection of the aseptic method. It is typical of the nature of the man that up to the year of his death he continued his researches on methods to improve suture material and the discovery of the absorbable ligature was the result of many years of arduous labor.

In 1869 Syme resigned the chair of clinical surgery at Edinburgh and Lister was chosen as his successor.

In spite of the tremendous pressure of a large practice and of his teaching duties Lister carried on for many years a most thorough investigation into the phenomena of fermentation and putrefaction. Godlee gives a most interesting account of this phase of his activities. It brought him into friendly intercourse with Pasteur, with whom he began a correspondence in 1876.

The story of the carbolic acid spray, how essential it was at first deemed in the antiseptic method, and how it was finally discarded, the manner of the introduction of gauze instead of lint or oakum as a dressing and the revival of the use of the rubber drainage tube of Chassaignac, all are well told and repay the reading. Lister was led to recommend the rubber tube for drainage because of the good result he obtained with it in an axillary abscess which he opened on the person of Queen Victoria. The controversy over Lister's discovery lasted many years and raged with great bitterness. His views met with much opposition among the older members of the profession and were more generally adopted in the provincial medical centers at an earlier date than in London. In Germany Lister's ideas were much more favorably received than they were in England. As early as 1867 Thiersch had adopted the antiseptic treatment, and his example was followed by many other surgeons of note, such as Volkmann and Stromeyer. Among the French surgeons Lucas-Championnière was from the beginning an ardent disciple of Lister. He had visited Glasgow in 1869 and saw Lister himself performing operations and dressing cases antiseptically, and in 1876 he published the first authoritative book on antiseptic surgery. In both the French and German armies in the War of 1870 there were some efforts by a few of the surgeons to apply antiseptic methods to the management of wounds. Lister published a short article entitled "A Method of Antiseptic

Treatment Applicable to Wounded Soldiers in the Present War," describing the simplest method he could devise to use carbolic acid as an antiseptic.

American surgeons had been somewhat slow in their adoption of the new method until after Lister's visit to Philadelphia in 1876, when at the International Medical Congress held in that city, he read a classic address on the subject. He made a most favorable impression and from that time his views gained steadily in America.

In 1879 Lister was appointed to the chair of clinical surgery in King's College, London. It is an interesting bit of evidence of his trend of mind that his introductory lecture should have been on "The Nature of Fermentation," which he also chose as his subject for his first address before the Pathological Society of London in the same year.

Lister was naturally a firm believer in the great value of vivisection in scientific research and Godlee gives a most interesting letter written by him in answer to one from Queen Victoria, in which she urged him to aid in the passage of an antivivisection bill. One of the permanent memorials to Lister is the Lister Institute of Preventive Medicine which is the great research center in London today.

In 1895 Lister was elected president of the Royal Society, an honor which had only once before been conferred on a surgeon, Sir Benjamin Brodie who was elected in 1855.

On the occasion of Queen Victoria's Jubilee in 1897 Lister was elevated to the peerage.

Lister had given up the active practice of his profession and henceforth occupied himself in public duties of a different character. In 1903 he suffered from some cerebral lesion which impaired his power of mental concentration and largely disabled him from physical exertion of any kind. He lived eight years longer, dying on February 10, 1912.

This biography is a fitting commemoration of the life of one who was not only a skilful surgeon but a leader in scientific research. Lister had a brilliant mind and a most delightful personality. All sides of his nature are well depicted by one who, though evidently a loving disciple of a great master, writes with judicial fairness of all the aspects of his career.

FRANCIS R. PACKARD, M.D.

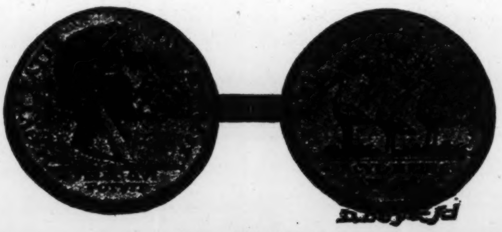
GUY PATIN AND THE MEDICAL PROFESSION IN PARIS IN THE SEVENTEENTH CENTURY.

By Francis R. Packard, M.D., xxii+ 334 pp., 8°. New York, Paul B. Hoeber, Inc., 1925.

The object of this book is to revive interest in a physician who was one of the leading practitioners of seventeenth century Paris and whose private and personal letters, edited by Reveillé-Parise (1846), Triaire (1907) and Pic (1911) are the most piquant and prolix repository of medical gossip ever printed. They were commented upon and criticized by no less than Voltaire, Fontenelle, Bayle, Sainte Beuve and Chéreau, and are, along with the comedies of Molière, our principal source book for the cultural flavor of French medicine in the age of Richelieu and Mazarin. Guy Patin (1601–1672) is, in effect, the Saint-Simon of medicine in the century nearly covered by his span of life, and if, as Voltaire and Bayle affirm, he is too petty and malicious in his judgments to be a safe guide through the secular history of his time, his pictures of the medical vagaries of the period are unquestionably the liveliest and most colorful we have. The reasons for his apparent recession into temporary oblivion are not far to seek. The European war, and the financial and social stresses following it, have absorbed too much of our energies to permit of literary browsing, and Patin himself is an interesting but not a particularly attractive writer or character. He was sharp, sly, shrewd, malicious, opinionated and dogmatic, in a remarkably long-nosed and hatchet-faced way, an intense hater, who, like John Knox, "laughed right merrilie" over the death of his enemies, and he was literally eaten up with professional jealousy. His century was great in anatomical and physiological discoveries, but, with the solitary exception of Sydenham, dull and retrograde in respect of surgery and internal medicine. Americans, moreover, still hug the cult of our pioneer and big-business periods, the preference for the "booster" over the "knocker." Their known ignorance of European political relations is due to the same facile optimism, to their aversion to die, like Billings' Mexican donkey, of "other people's troubles." Patin himself was unable to see Richelieu and Mazarin as capable and remarkable statesmen. He hated both for excellent reasons and was otherwise too close to the goings-on of his time to see them in proper perspective. But he drove a facile and effective pen, and the physician who wishes to understand French medicine in this period cannot afford to neglect his pages.

For his task, Dr. Packard, our best scholar in French and American medicine, is well equipped, and he has executed it with charm and competence. In an utterly simple and unpretentious manner, he has excerpted the most telling and illuminative passages in the Patin letters and invested them with a running commentary which throws the text into relief, as values in the picture. The historical foreword and the sidelights on the medicine of the time are brief, accurate and to the point. We see old Patin as a sedentary, well-to-do home-body, like all bookmen, averse to travel, declining lucrative chairs in Italy and Denmark, hating crowds, noise and civic parades, full of "sour-grapes" jealousy toward all royal physicians (of whom Packard gives a long list), a scolder of priests, of Arabists and iatrochemists, of the devotees of antimony, opium and cinchona bark, of quacks and avaricious apothecaries, yet a highly esteemed practitioner, withal, among the *grands bourgeois* and inclined to boast of an occasional filtering-in of aristocratic patients. He was an upholder of the best traditions of Greek medicine, albeit a pitiless blood-letter, and while he believed that pneumonia is fatal to red-headed people and that Paré did not write his own works, his views on matters of greater importance are, in the main, sound and correct. Osler probably favored his censure of the Arabist "multiplicity of useless remedies," his "martyrology of antimony," his successful onslaught on the mercenary apothecaries (so that bleeding and purging were done thereafter by servants in great houses) and the exquisite literary touch in his judgment of Sir Thomas Browne ("an agreeable melancholic") and the "Religio Medici" ("strange and ravishing thoughts"). Patin saw clearly that syphilis existed in Europe before the siege of Naples, that breast-feeding for infants is superior to pap, and his lists of books for medical students are of the very best. Even his view that Paré's "Surgery" made a poor textbook was probably sound. A diverting character is Patin's friend and familiar, the librarian Gabriel Naudé, who bought medical books by the pound or cubic foot. The reader will derive plenty of amusement from witty Patin in his lifelong assumption of the parlous rôle of "anti-physician" (*censor morum medicorum*), but he is seen at his best as an amiable quietist, burning the oil among those old folios which Charles Lamb styled his "midnight darlings." The well-executed illustrations add to the charm of the book.

F. H. GARRISON, M.D.



Jeton of Guy Patin

Frontispiece
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JEAN MARTIN CHARCOT
[1825-1893]